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THESIS

**HYDROPOLITICS AND THE PROSPECT FOR PEACE IN
THE ARAB-ISRAELI CONFLICT**

by

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Of all the disagreements associated with the present Arab-Israeli conflict, perhaps none is more important than the discord and outright hostility generated by the increasing absence of the most fundamental of all human needs, water. Since the Israeli occupation of the West Bank and Gaza Strip began after the 1967 Six Day War, Israeli military orders have denied Palestinian involvement in the management and development of water resources and have limited increases in water consumption by the Arab population for both agricultural and domestic use. As a result, Israelis consume a significantly larger amount of water per capita than Palestinians in the Occupied Territories.

Water is a vital commodity and an essential element necessary to satisfy accelerating rates of urbanization, industrialization, and population growth – trends that will continue through 2020.

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Block 13. Abstract

This thesis sets out to assess what affect the increasing demands on water resources will have on the Arab-Israeli conflict. This thesis will argue that the issues concerning hydropolitics, such as water rights (sovereign versus natural), and the relationship between and disagreement over water and territorial sovereignty, may serve to destabilize and ultimately fracture any “final settlement” agreement. The growing scarcity of water is a threat to regional stability in the Middle East. As such, it has significant implications for U.S. foreign policy and military strategy.

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ISRAELI CONFLICT**

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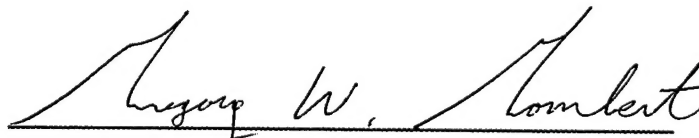
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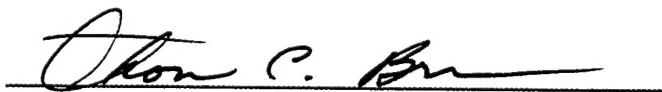
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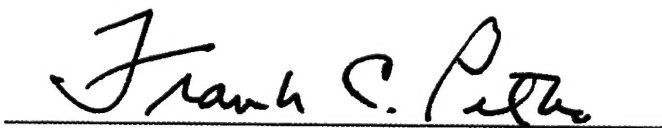
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Water is a vital commodity and an essential element necessary to satisfy accelerating rates of urbanization, industrialization, and population growth – trends that will continue to through 2020. This thesis sets out to assess what affect the increasing demands on water resources will have on the Arab-Israeli conflict. This thesis will argue that the issue concerning hydropolitics, such as water rights (sovereign versus natural), and the relationship between and disagreement over water and territorial sovereignty, may serve to destabilize and ultimately fracture any “final settlement” agreement. The growing scarcity of water is a threat to regional stability in the Middle East. As such, it has significant implication for U.S. foreign policy and military strategy.

TABLE OF CONTENTS

I. INTRODUCTION	1
II. HISTORICAL ANALYSIS OF THE ARAB-ISRAELI WATER DISPUTE	13
A. PRE-1948.....	13
B. 1948 - 1953.....	13
C. 1953: U.S. INVOLVEMENT BEGINS	16
D. MAIN, ARAB, AND COTTON PLANS CONSIDERED.....	17
E. 1955 - 1964.....	20
F. WATER SCARCITY AND THE SIX DAY WAR	22
G. 1967 - 1998.....	24
III. THE PROBLEM.....	27
IV. ISRAEL'S DILEMMA	37
V. PALESTINE'S PREDICAMENT.....	51
VI. IMPLICATIONS FOR U.S. FOREIGN POLICY.....	61
VII. CONCLUSION.....	67
A. THE ARAB-ISRAELI CONFLICT	67
B. THE MIDDLE EAST	75
LIST OF REFERENCES.....	77
INITIAL DISTRIBUTION LIST	83

I. INTRODUCTION

For Him (alone) is prayer
In Truth: any others that they
Call upon besides Him hear them
No more than if they were
To stretch forth their hands
For water to reach their mouths
But it reaches them not...

Qur'an, Surah 13:14.

The severity of the Middle Eastern water problems will unavoidably increase substantially during the remainder of this century and into the twenty-first century...In an already overheated atmosphere of political hostility, insufficient water to satisfy population growth and the economic needs of each MENA nation could lead to war.

Charles Issawi, Middle East Economic Digest.

The wars of the next century will be over water.

The World Bank, Water Resources Planning and Development in Jordan.

In the summer of 1997, Israel moved to further ensure future unlimited access to the waters of the Jordan River basin. Once again, as in the years 1951 to 1970 and 1992 to 1995, the issue of water and its relationship to territorial sovereignty created discord between Jews and Arabs. On August 26th, Israel's Water Commissioner, Meir Ben-Meir, announced that Israel had decided to go ahead with plans to build a dam at Al Hama, which is located along the Yarmouk River, approximately 3.5 miles northeast of Adassiya, Jordan.¹ The decision came as a surprise to Syria because in 1994 Yitzak Rabin, who was Israel's Prime Minister at the time, and King Hussein of Jordan had agreed that the dam site would be constructed one mile downstream from Al Hama – in the direction of Israel and out of territory claimed by Syria (i.e., the Golan Heights). Yitzak Rabin at the time pledged to build the dam at a point where Israel and Jordan met,

¹ Douglas Jhel, "Israel to Build Dam on Disputed Land Claimed by Syria," *New York Times*, 26 August 1997, p. A3.

roughly one-half mile downstream from an old DMZ – one which was originally agreed upon between Syria and Israel on July 20th, 1949 in armistice and cease-fire agreements following the 1948-49 Arab-Israeli War.² As it is now, however, Israel still intends to go ahead and build in the Al Hama enclave of the Golan Heights.

This has only served to agitate President Assad and worsen the prospect for peace between Syria and Israel. In fact, Syria and Israel are still technically in a state of war that goes back to 1948. Peace talks were last held in January 1996. As its price for peace, Syria insists that Israel withdraw to the lines that it held on June 4th, 1967, just before the outbreak of the Six Day War. This demand, which encompasses territorial concessions including the Golan Heights and stretches beyond the recognized international border, exceeds what Israel's Prime Minister Binyamin Netanyahu is willing to accept. As far as the Al Hama dam project is concerned, a Syrian senior official condemned the plan and stated that "it proves that Netanyahu, as Yasir Arafat has said about settlement expansion and construction in East Jerusalem, is trying to create facts on the ground in the Israeli-occupied Golan Heights that would be difficult to revise in a final peace settlement...Netanyahu does not want peace, he wants only to escalate tensions in the region."³ Israel's Water Commissioner countered that the area had always been a part of Israel. Binyamin Netanyahu added that it was important to use the dam "to make clear that Israel rejected Syria's most far-reaching land claim."⁴

² The pledge referred to here was included in the Israeli-Jordanian accord of 1994 for two reasons. First, to reward Jordan who after the dam was built would be allowed to divert river water for its own use. Essentially, it was increased water in exchange for united opposition to Syrian claims to the Golan Heights. Second, the proposed location was selected to avoid provoking Syria so that a possible peace accord could be reached. At the time, Yitzak Rabin was very much interested in resolving the Arab-Israeli conflict and was looking to make progress in order to improve Israel's security dilemma.

³ Jhel, "Israel to Build Dam on Disputed Land," p. A3.

⁴ Ibid.

As is the case with so many other issues in the Arab-Israeli conflict, this particular dispute is a bit more convoluted and complicated than it would first appear. As previously described, not only is Syria involved, but Jordan as well. With Netanyahu's decision, King Hussein was placed in the precarious position of having to choose between taking water, thereby alienating a powerful neighbor that possesses connections to terrorist organizations, or doing without new and badly needed water supplies required for accelerating urbanization and industrialization. It is conceivable that this disagreement may eventually escalate to armed conflict. After all, Syria and Israel went to war in 1967, and one of the factors contributing to pre-conflict tension was a Syrian maneuver to restrict water flow to Israel from the Yarmouk and Jordan rivers.⁵ When considering Israel's decision to build in disputed territory at Al Hama and the possible disastrous consequences, it appears that the premonitions posited by the *Middle East Economic Digest* in 1991 and the World Bank in 1995, quoted at the beginning of this chapter, may, in fact, come true.

That armed conflict may result in the Middle East and at other points around the world due to competition over access to water has not been lost on the United Nations (UN), the World Bank, the North Atlantic Treaty Organization (NATO), or the United States.⁶ The urgency of water issues is increasingly recognized worldwide and there is

⁵ Masahiro Murakami, *Managing Water for Peace in the Middle East* (United Nations: United Nations University Press, 1995), pp. 296-297.

⁶ In Southern Africa, Namibia intends to divert water from the Okavango River, thereby limiting flow to neighbor Botswana – they've shot each other in the past over disagreements on how to equitably divide the river. In India, disagreement concerning how to allocate the water of the Ganges River between Bangladesh and India has caused border tension for the last thirty years. Despite Turkey's proposed 'Peace Pipeline Project' of 1987, threats have been exchanged, especially between Iraq and Turkey, over water flow from Turkey via the Euphrates and Tigris to Syria and Iraq. Turkey, via a series of dams, has reduced the Euphrates's average annual river flow at the Turkish-Syrian border from $30 \times 10^9 \text{ m}^3$ to $8 \times 10^9 \text{ m}^3$. As for annual average flow to Iraq, flow has been reduced by Turkey and Syria from 33 to $8 \times 10^9 \text{ m}^3$. Finally, in Northern Africa, Egypt, long the dominant user of the Nile, faces encroachments on the river from

growing consensus on the principles that should guide action in this area.⁷ With respect to the Middle East and the Jordan River basin specifically, where population growth and urban/industrial development have overwhelmed traditional management practices, and the problems of water scarcity and pollution are as severe as anywhere in the world,⁸ it is clear that the increasing dearth of water and the high cost of replenishing present sources will have significant impact on the political framework constructed in the peace agreements between Israel and the PLO of September 1993 (Oslo I) and Israel and Jordan (indirectly Syria as well) of October 1994. At a minimum, reallocation issues must be addressed if the impending crisis is to be effectively and efficiently managed, and if costly desalination and other prohibitively expensive non-conventional sources are to be avoided.

In conjunction with the UN, the World Bank has placed major emphasis on assisting countries in tackling their water resources problems. In 1993, the World Bank, through a new Water Resources Management Policy, shifted its focus from the needs of individual water-using sectors to an integrated management approach that emphasized water-sharing cooperation among Israel, Palestine,⁹ Jordan, Egypt, and to a lesser degree

Ethiopia and Sudan, who are trying to cope with accelerating urbanization, population growth, and economic development.

⁷ Jeremy Berkoff, *A Strategy for Managing Water in the Middle East and North Africa* (Washington, D.C.: The World Bank, 1994), pp. 7-8.

⁸ By the year 2025, per capita renewable supplies will have fallen from 3,340 cubic meters to 667 cubic meters – a drop of 80 percent. In several countries of the region, Israel and Palestine (defined as the West Bank and Gaza Strip combined) included, renewable freshwater will barely cover basic human needs. An empirical measure of water scarcity, developed by Malin Falkenmark, the International Union for the Conservation of Nature, and the World Bank, indicates that a country is “water stressed” if has less than 1,000 cubic meters/person/year. In 2020, Israel’s renewable resources per capita in cubic meters per year will be 311, Jordan’s - 91, Palestine’s - 72, and Syria’s - 161. See Berkoff, *A Strategy for Managing Water*, pp. 9 and 68. And also, Alan Richards and John Waterbury, *A Political Economy of the Middle East*, 2nd ed. (Boulder: Westview Press, 1996), p. 162.

⁹ This thesis defines Palestine as the West Bank and Gaza Strip.

Syria.¹⁰ This new policy was enacted to meet increasing water shortages predicted for the twenty-first century and because past water policies of these countries were unilaterally planned and executed with disregard for the needs of a neighbor. Often, they were worded in zero-sum terms, somewhat mirroring the "zero-sum game" atmosphere of the Cold War. In short, the World Bank has been trying to persuade these countries of the Levant region to manage and share water in an integrated – equitable manner so that each can meet its respective economic, social (health), environmental, and most importantly, security objectives.

The World Bank and the UN have treated water as a key resource for economic and social development and placed emphasis on managing water-sharing agreements, water demands, pollution, and joint water augmentation projects in order to prevent these countries from going to war over water.¹¹ As for NATO, in a recent statement the Assistant Secretary General Foreest acknowledged that internationally water is becoming a national security issue, particularly for countries and territories like Israel, Jordan, Syria, Turkey, Iraq, and Palestine:

In the twenty-first century, wars will be fought for ecological reasons. Ecologists understand that the deteriorating relationship between four billion humans and the earth's biological systems cannot continue. But few political leaders have yet to grasp the social *and economic* (emphasis added) significance of this unsustainable situation.¹²

¹⁰ Berkoff, *A Strategy for Managing Water*, pp. xi-xii and 7-8.

¹¹ The World Bank, on average over the last thirty-two years, has accounted for 14 percent of lending worldwide and 16 percent in MENA (Algeria, Iran, Libya, Malta, Morocco, Tunisia, Bahrain, Egypt, Iraq, Jordan, Israel, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, UAE, and the Yemen Republic) when it comes to water development and conservation projects. In fact, of the 800 approved and funded projects, 100 have involved MENA countries; specifically, 11 for Israel and Jordan (Palestine included). See Berkoff, *A Strategy for Managing Water*, pp. 4-6.

¹² Lester Brown, *State of the World 1994* (New York: Worldwatch Institute, 1997), p. 61.

In 1993, the Central Intelligence Agency (CIA) published a risk assessment paper for the United States government that estimated that in at least ten places worldwide war could erupt over dwindling shared water resources.¹³ The majority of the potential crisis spots were located in the Middle East. As a matter of fact, this assessment was undertaken as a result of concerns the Pentagon had in 1992 when it reviewed other possible future conflicts that might call for American intervention. One of the first contingencies studied was war between Turkey and Syria over the water resources of the Euphrates, with the added possibility that Iraq might get involved. Five years later things have not changed. As reported by the *Wall Street Journal* in an article published in November 1997 titled, "Greenpolitik: Threats to Environment Provoke a New Security Agenda," the CIA has formed a new environmental center run by the Director of Assessments whose focus is to monitor environmental policy and relations between various countries.¹⁴ High level positions dealing with the environment also exist at the National Security Council (NSC), the National Intelligence Council (NIC), and the Department of Defense (DOD). The Department of State has established six new regional environment hubs to monitor water, marine, desert, and forestry resources and government environment policies. Of the six new "outposts of natural diplomacy," four directly involve water resource management issues.¹⁵ The point of the article is that, with the end of the Cold War, counting a country's tanks, troops, and missiles is no longer

¹³ Bulloch and Darwish, *Water Wars: Coming Conflicts in the Middle East* (London: London University Press, 1993), p. 16.

¹⁴ Amy Dockerson, "Greenpolitik: Threats to Environment Provoke a New Security Agenda," *Wall Street Journal*, 20 November 1997, p. A19.

¹⁵ They are: Amman, Jordan (water-sharing and environmental issues arising out of the Mideast peace process; Addis Ababa, Ethiopia (the Nile and desertification); Tashkent, Uzbekistan (degradation of the Aral Sea); and Kathmandu, Nepal (water-sharing and alternative energy strategies).

sufficient to assess threats to America's national security. It is also important to monitor countries that pose environmental threats to our friends and allies.

Unquestionably, the increasing scarcity of water worldwide could have some disastrous repercussions. This thesis, however, will not address every potential source of conflict but will focus on the Jordan River basin. In the Levant region there are two natural sources of water: rivers and aquifers. The Jordan and Yarmouk are the major rivers; aquifers are to be found under much of Israel, Jordan, and the West Bank.¹⁶ According to Israeli estimates, which are disputed by the Palestinian Liberation Organization (PLO), Israel obtains two-thirds of its annual water consumption from the Jordan, mostly from the waters that originate in the Golan Heights, and one-third from the West Bank's aquifers. Since the Israeli occupation of the West Bank, Golan Heights, and Gaza Strip after the 1967 Six Day War, Israeli civil and military orders have limited Palestinian water consumption for agricultural and domestic use and have also constrained Arab involvement in the management and development of water resources.

Zionists from the beginning claimed that their foresight, use of technology, and good management enabled them to secure and utilize new sources of water in Palestine. Israel, as evidence of its ingenious planning, points to the draining of the swamps of the Huleh River valley, the building of the complex of dams, pipelines, and pumping stations that comprise the National Water Carrier, and the irrigation schemes and desalination plants that enable Israel to survive. All this is to say that Israelis, in Israel proper and the growing settlements, now consume roughly four times more water per capita than

¹⁶ Aquifer: an underground stratum of porous rock and sediment capable of storing water and transmitting it to wells, springs, or surface water bodies such as lakes. See Berkoff, *A Strategy for Managing Water*, p. vii.

Palestinians in the Occupied Territories. The Arabs have countered that Israel's disproportionate use of the Levant's water is virtual theft.

Behind the religious and political rhetoric of the Arab-Israeli conflict, there exists a need to control water sources and their use that, in fact, underlies many of the national security policies of Israel and the PLO. Israel's attempt to dam and use the water of the Jordan in the early 1950s were hotly contested by Jordan and Syria. Although the Eisenhower administration negotiated an agreement of water allocation among Israel, Jordan (Palestine included), Syria, and Lebanon in 1953, it was never ratified by all parties. The issue did not simply concern water but territorial sovereignty and therefore national security as well. Because the issue of water was related to national security, Israel and Syria engaged in several limited military exchanges along the Israeli-Syrian DMZ, all of which involved Arab attempts to divert water Israel claimed as its own. The difficulties for Israel stemmed from the fact that virtually none of the water it consumed originated in Israel itself. Israel countered Syrian encroachments into the DMZ, which were orchestrated to deny Israel use of the Banias and Hasbani rivers, with force. In the end, Israel, Syria, and Palestinians went to war. Israel eventually captured the Golan Heights and the West Bank in 1967. This victory gave Israel control of not only the headwaters of the Jordan but also the aquifers under the West Bank.¹⁷ This threatened Syria, Jordan, and the Palestinians.

Part of any permanent peace settlement between Israel and the Palestinians must include an equitable sharing of the Levant region's water resources as well as cooperation

¹⁷ The headwaters of the Jordan include: the Dan, Hasbani, and Banias rivers and Lake Huleh. The West Bank's aquifers include: the Yaqon-Tanimim (or Western Basin), the Nablus-Jenin (or Northern Basin), and the Eastern Basin. For a map illustrating the West Bank's aquifers see Asit Biswas, John Kolars,

on managing existing and new water supplies. The water accords in the Taba – or Interim – Agreement of September 1995 represented a step towards reconciling this dispute. However, disputes over water rights as defined by international law and such questions as the relationship between water and territory remain. Increasingly, the PLO is clamoring for more water in order to meet expanding agricultural and domestic needs which are driven by accelerating population growth. The question for Israel is how this can be accomplished without compromising its water consumption and ultimately its national security.

This thesis assesses the effect of increasing depletion of water resources on the Arab-Israeli conflict. More specifically, it will argue that what might be called “hydropolitics,” such as water-sharing agreements, water rights (sovereign versus natural), and most importantly, the relationship between and disagreement over water and territorial sovereignty, may serve to destabilize and ultimately fracture any “final settlement” agreement. In the end, water scarcity may be more than simply a bump in the road in the peace process. It may pose a serious, independent threat to regional stability in the Middle East. As such, it has significant implications for US foreign policy and military strategy.

This thesis is divided into five chapters. The first is an historical analysis of the riparian dispute beginning with the Johnston mission to the Middle East of 1953 – 1956. The analysis begins in the post-1949 period because up until the creation of the state of Israel there was no dispute as to whom the waters of the Jordan basin belonged. The Palestinians in Palestine consumed the water of the West Bank aquifers and the Jordan

Masahiro Murakami, John Waterbury, and Aaron Wolf, *Core and Periphery: A Comprehensive Approach to Middle Eastern Water* (Oxford: Oxford University Press, 1997), p. 13.

River; Transjordan shared the Jordan River with Palestine; Syria, an upstream riparian and the most powerful of the concerned Arab states, had relatively little use for access to the Jordan River – Syria's focus was on the waters of the Euphrates, Tigris, and Yarmouk rivers; and Lebanon met its water needs from the Litani River. Following the 1948-49 Arab-Israeli War, a dispute began with respect to equitable allocation of the basin's water because both the new states of Israel and Jordan required incredible amounts of water to meet accelerating demand driven by a massive influx of immigrants/refugees. In essence, the roots of the conflict were the result of the convergence of two trends: (1) resource scarcity in Israel, Palestine, and Jordan and (2) Israel's aggressive effort to establish itself as a self-sufficient and sovereign state. Chapter II is not simply an historical account of the facts and events of the dispute from 1949 onward. It is an analysis of why the Johnston mission failed and how the exchange still impacts today's negotiations. Chapter II also analyzes the Jordan water crisis of 1964, in order to show that the Palestinians' oncoming water crisis resembles that of Jordan's of 1964. In other words, unless the water needs of the Arabs are met, the dispute will continue and may result in armed conflict..

Chapter III briefly summarizes the water scarcity problem, focusing on predictions for the next twenty-two years. The region's shortages will be qualified and quantified via a comparison of supply versus demand in the Jordan River basin. Chapter IV quantifies Israel's dilemma and Chapter V does the same with respect to the Palestinians. The focus in both chapters is on the impact that accelerating rates of population growth, urbanization, and industrialization will have on the water reserves the region. Included is a short summary of international law respecting water, in the context

of the Arab-Israeli conflict. International law is generally unclear concerning arguments over water rights and such questions as the relationship between water and territory. There are two conflicting claims: that made by the up/midstream state (i.e., Israel) that water is theirs by "sovereign right," and that by downstream riparians (i.e., the Palestinians and Jordan) that they have historic or "natural rights" to the water of the Jordan basin. Both claims have been drawn upon in present negotiations.

Chapter VI will address the impact of water scarcity on the region as a whole. The aim is to assess what water scarcity might mean to United States national security interests. The thesis concludes with an assessment of the prospects for cooperation. The focus will be on the dynamics of state behavior and how a country perceives its security dilemma very much affects its political decisions concerning natural resources that are in short supply.

II. HISTORICAL ANALYSIS OF THE ARAB-ISRAELI WATER DISPUTE

A. PRE-1948

Up until the creation of the State of Israel following the 1948 Arab-Israeli War, there was little dispute as to whom the waters of the Jordan basin belonged. The Palestinians in Palestine consumed the waters of the West Bank aquifers and the Jordan River, assured by the League of Nations in 1922 that under the British and French Mandates that which flowed on their territory was theirs to use. Transjordan shared the Jordan River with Palestine and acquired additional water from the Yarmouk River. Syria, an upstream riparian and the most powerful of the concerned Arab states at the time, had relatively little use for access to the Jordan River – Syria's focus was on the waters of the Euphrates, Tigris, and to a lesser extent the Yarmouk. Lebanon met its water needs with the Litani River. Following the 1948 Arab-Israeli War, a dispute began with respect to the allocation of the basin's water because both of the new states – Israel and Jordan – required incredible amounts of water to meet accelerating demand which was driven by a massive influx of immigrants and Palestinian refugees. In essence, the roots of the conflict were the result of the convergence of two trends: (1) resources scarcity in Israel, Palestine, and Jordan and (2) Israel's aggressive effort to establish itself as a self-sufficient and sovereign state.

B. 1948 - 1953

The 1948 War aggravated already-existing, but at the time manageable, difficulties of cooperative water management. Up until 1948, the Franhia and

Mavromatis Plans, the Henriques Report, the Palestine Land Development Company, the Ironides Survey, the Lowdermilk Plan, the Survey of Palestine, and the Hays-Savage Plan had all adequately and peacefully dealt with the distribution of water resources.¹⁸ When the war ended on February 24, 1949, following armistice agreements between Egypt-Israel, Syria-Israel, and Jordan-Israel, the dispute began. The fragile armistice agreements did not deal with water. Consequently, each riparian country unilaterally moved to exploit the Jordan River system with blatant disregard for the needs of the other.

Israel commenced with its planning immediately after 1949. The comprehensive All Israel Plan, completed in 1951, included the draining of the Huleh swamp, the diversion of the Jordan River, and the construction of a National Water Carrier system (also known as the Carrier).¹⁹ This plan became the keystone of Israel's water development, diverting water of the Jordan to the coastal plains and the Negev desert. Jordan and Syria were adamantly opposed to Israel's plan to divert water from the Jordan River. They both appealed to the United Nations; specifically, to the Truce Supervision Organization (TSO) and the Mixed Armistice Commissions (MAC). Syria vehemently and correctly pointed out that Israel's work on the Huleh Dam violated the DMZ established in 1949.²⁰ Syria countered by threatening to divert the Banias River, one of three sources of the Jordan River. King Abdullah of Jordan responded by turning to the

¹⁸ Thomas Naff and Ruth C. Matson, eds., *Water in the Middle East: Conflict or Cooperation?* (Boulder: Westview Press, 1984). See also, Murakami, *Managing Water for Peace*, pp. 287-288.

¹⁹ Murakami, *Managing Water for Peace*, p. 288.

²⁰ The DMZ was located along the upper Jordan River and the southeastern shores of Lake Galilee. At issue were different interpretations of the zone's legal status. Syria, as the most powerful Arab state at the time, objected to Israel's pursuit of development projects in contested territory. But, Jordan was concerned about possible harm Israel would cause to the Jordan River as its work was upstream and the construction constricted natural flow along the River in a southerly direction. For a discussion on the violations of the

United Nations Relief and Works Agency (UNRWA) for assistance in developing a plan to: (1) construct irrigation canals down both sides of the Jordan valley, (2) build a dam on the Yarmouk River at Maqarin in order to store fresh water for Jordanian use (this was key because it would circumvent the need to cooperate with Israel), and (3) if step two failed, then divert the Yarmouk River directly into Lake Galilee. The plan was designed to preserve and improve Jordanian agriculture and assist in resettling Palestinian refugees.²¹ Simultaneously, Israel was hoarding water to develop its economy and support the influx of immigrants, while Jordan was doing the same to handle large numbers of Palestinian refugees.²²

Despite the protests by Jordan, Syria, the UN, and later the United States, Israel proceeded with the first part of its project, the draining of the Huleh swamps – an operation that put Israel in contested territory. As a result, Israel was forced to stop work in May 1951. However, one month later, Israel was allowed to continue, and consequently, it resumed draining the Huleh swamps in order to reclaim approximately 154,375 acres for agricultural development.²³ Concurrently, Israel periodically closed the sluice (or diversion dam) gates of the Jordan River at the southern tip of Lake Galilee. As a result of these actions, the salinity of the water downstream increased and therefore

Armistice Agreements see Fred J. Khouri, *The Arab-Israeli Dilemma* (New York: Syracuse University Press, 1968), pp. 182-203.

²¹ This was known as the Bunker Plan, named after an American engineer working with the UNRWA at the time, who designed the development project.

²² By the end of 1951, 680,000 immigrants had arrived in Israel. Jordan was immediately confronted with the influx of 350,000 Palestinian refugees. See Ian J. Bickerton and Carla L. Klausner, *A Concise History of the Arab-Israeli Conflict*, 3rd ed. (New Jersey: Prentice Hall, 1998), pp. 100-101.

²³ Michael Brecher, *Decisions in Israel's Foreign Policy* (New Haven: Yale University Press, 1975), p. 192.

could not be used by Jordan to irrigate valley lands where, as of 1952, 800,000 Arab refugees had settled.²⁴

C. 1953: U.S. INVOLVEMENT BEGINS

In May 1953, the United States stepped in to resolve the dispute. It did so for a variety of economic, ideological, political, and security reasons.²⁵ In short, providing for and settling the refugees was key to both the prevention of the spread of communism and the resolution of the Arab-Israeli conflict. The United States believed that poverty provided a “fertile breeding ground” for communism.²⁶ That is, the underdeveloped Arab states, with increasingly nationalistic policies, and the Palestinian refugees, who were marginalized and frequently despondent, were vulnerable to communist ideology. In the end, the United States recognized that riparian water rights and area peace (i.e., regional stability) were intimately linked. After all, it was difficult to ignore the fact that Israel’s infringement upon the DMZ, executed to secure access to badly needed water supplies, had provoked a number of military incidents between Syria and Israel. While some incidents involved attempts by both sides to harass and remove unwanted population elements or to protect personal property, others were intended to interfere with the development of water resources and apply pressure on the midstream riparian (i.e., Israel) to make concessions or suffer the loss of badly needed water supplies.²⁷

²⁴ Bickerton and Klausner, *A Concise History*, pp. 100-102.

²⁵ Cecil V. Crabb, Jr., *The Doctrines of American Foreign Policy: Their Meaning, Role, and Future* (Baton Rouge: Louisiana State University Press, 1982), pp. 153-192. And also, Bickerton and Klausner, *A Concise History*, pp. 91 and 96.

²⁶ Dana A. Schmidt, “Prospects for a Solution of the Jordan River Valley Dispute,” *Middle Eastern Affairs* Vol. 6, No. 1 (January 1955), p. 5.

²⁷ For a detailed description of water-related cease-fire violations in the Jordan River system between 1951 and 1967 see Murakami, *Managing Water for Peace*, pp. 288-291.

Following the Truman administration's May acknowledgement of the importance of the riparian dispute, the United States sent envoy Eric Johnston to the Middle East to act as a special ambassador and mediate a comprehensive plan for the regional development of the Jordan River system. The focus was to promote cooperation, economic stability, and thus, peace. Between 1953 and 1955, the original plan suggested by envoy Johnston, known as the Unified (or Main Plan), was modified three times in four rounds of multilateral negotiations because an overall agreement could not be reached with respect to: (1) equitable water quotas for each riparian; (2) the use of Lake Galilee as a storage facility (a controversial issue because the lake was under the exclusive control of Israel at the time. Moreover, it was simply a poor storage site because the lake would pollute any of the lower-salinity water that was planned for diversion from the Yarmouk River); (3) Israeli use of Jordan waters for out-of-basin areas;²⁸ and (4) the nature of "international supervision and guarantees." That is, what constitutes a joint water authority? Who would be the final arbiter, etc.²⁹

D. MAIN, ARAB, AND COTTON PLANS CONSIDERED

After four rounds of negotiations, no settlement was reached. The original Unified (or Main Plan), which proposed that: (1) Jordan should receive a substantially greater amount of water than it would from the unilateral development of the Yarmouk River alone; (2) Israel should renounce all rights to divert for irrigation more than a specified minimal amount from the Jordan River; and (3) armistice lines should be

²⁸ The Arabs weren't so much concerned that this was "Arab water" or that it may even contravene international legal principals. They were apprehensive because the water would be used for Israel's economic development, and thus, it would strengthen an enemy.

²⁹ Murakami, *Managing Water for Peace*, pp. 292-293.

adjusted so that Israel no longer possessed exclusive access to and control of Lake Galilee, failed to please both sides.³⁰ The Arab Committee countered with an Arab Plan, which allocated to Israel approximately 20 percent of the waters of the Jordan River system – as opposed to 33 percent in the Main Plan (from 394mcm to 270mcm),³¹ and gave Syria a threefold increase in water supply (from 45mcm to 120mcm).³² The Arab Committee, composed of representatives from Egypt, Syria, Jordan, and Lebanon, offered a counter-proposal because it believed that America was pro-Zionist; that U.S. economic assistance was an attempt to promote collaboration with Israel and dupe the Arabs into recognizing the Jewish state. They were committed to non-cooperation and non-recognition out of principle.³³

Israel countered with the Cotton Plan.³⁴ It was designed to meet Israel's economic development strategy and its aspirations to provide an economic basis for future large-scale immigration. The plan included the diversion of the Litani River into the Jordan system via Lake Galilee. All of this water would be allotted to Israel. It also directed all surplus water from the Yarmouk River, following the distribution of a moderate amount to Jordan, and to Israel. In sum, the allocation of water to Israel was increased more than threefold (from 394mcm to 1,290mcm), Jordan's was cut by 25 percent (774mcm to 575mcm), and Syria's by 30 percent (45mcm to 30 mcm).³⁵ Israel essentially proposed a larger development project in the hopes of expanding the 'water pie' so that all parties would be satisfied (the total volume of water to be shared increased

³⁰ Naff and Matson, *Water in the Middle East*, p. 187.

³¹ The unit of measurement referred to, mcm, stands for: million cubic meters.

³² Ibid., p. 192 and Murakami, *Managing Water for Peace*, p. 295.

³³ Miriam R. Lowi, *Water and Power* (New York: Cambridge University Press, 1993), pp. 87-89.

³⁴ Ibid., pp. 90-91.

³⁵ Murakami, *Managing Water for Peace*, p. 295.

from 1,213mcm to 2,426mcm and the irrigated land area was three times as large³⁵). Rounds two and three failed to resolve the stalemate.³⁶ Israel insisted on the Jordan River for Israel and the Yarmouk for both Jordan and Syria, minus Israel's historic and anticipated used from the Yarmouk. With not enough water, Israel asserted that it could not meet its security needs (the very same position it holds today, but for additional reasons as mentioned in the introduction, such as settlement expansion, urbanization and industrialization):

We have serious grounds to fear that this will involve us in complications and will open the way for endangering our very vital interests...We are a young state. We are a small state. We are a state hemmed in by enemies on all sides. It is quite natural that we should be particularly jealous in safeguarding our territorial integrity and the completeness of our sovereign rights.³⁷

Round four started in August 1955. By this time, the Israelis had agreed to the following: (1) Israel would get the Jordan River and divert limited amounts of water to Syria (132mcm), Jordan (537mcm), and Lebanon (35mcm); (2) Jordan and Syria would get the Yarmouk River, with most of it going to Jordan; (3) Israel would concede an additional 50mcm per year from Lake Galilee to Jordan; and (4) the creation of additional storage space in Lake Galilee for the conservation of Yarmouk river flows.³⁸ However, Lebanon rejected the proposal, as did Egypt, Jordan, and Syria. They believed that the plan was designed to "liquidate the refugee problem rather than to allow the refugees

³⁵ Figures vary, but the best source appears to be Lowi, *Water and Power*, pp. 86 and 91.

³⁶ For a account of the negotiations in rounds two and three see Lowi, *Water and Power*, pp. 92-100.

³⁷ Lowi, *Water and Power*, p. 106.

³⁸ Brecher, *Israel's Foreign Policy*, pp. 187-190. And also, Lowi, *Water and Power*, pp. 97-98.

their right to repatriation.” At this point in the history of the riparian dispute, the Jordan waters question was forever linked to the Palestinian Problem.³⁹

E. 1955 - 1964

In the end, no final understanding was reached on precise allocations. Even now, the amounts delineated in the Unified (or Main Plan) remain the *de facto* allocations. Israel expects the Jordanians to withdrawal no more than 760 mcm per year, and from that amount Israel suggests the Palestinians take their requested share and no more.⁴⁰ Ultimately, the security-related concerns of Israel governed their behavior and any propensity they might have had to cooperate. Their “economic-developmental needs fell victim to inter-state conflict...They were restricted from selecting the ideal solution because of their geopolitical concerns.”⁴¹ As for the Arabs, their perception that Israel was a “foreign intrusion and a western imperialist construct” – and their subsequent position of non-cooperation and non-recognition – precluded them from agreeing to any plan, no matter how equitable the proposed allocation of the region’s water resources.⁴² The United States, convinced that a water-sharing agreement could be used as a “gateway to peace and cooperation,”⁴³ continued with its mediation effort. However, because water was absolutely essential for both Israel and Jordan (as it is now), both states independently pursued projects in their own territories. The multilateral approach failed,

³⁹ Lowi, *Water and Power*, p. 100 and Daniel Hillel, *Rivers of Eden: The Struggle for Water and the Quest for Peace in the Middle East* (Oxford: Oxford University Press, 1994), pp. 106-161.

⁴⁰ Elias Salameh, “Jordan’s Water Resources: Development and Future Prospects,” *American-Arab Affairs* No. 33 (Summer 1990), p. 27.

⁴¹ Miriam R. Lowi, “Resource Scarcity and Protracted Conflict,” in Daniel Deudney and Richard Matthew, eds., *Contested Ground: Security and Conflict in the New Environmental Politics* (New York: State University of New York Press, 1995), p. 105.

⁴² *Ibid.*, p. 108.

⁴³ Lowi, *Water and Power*, p. 105.

which further reinforced unilateral development. What ensued were multiple water-related cease-fire violations between December 1955 and April 1967, which, along with the Suez War of 1956, subsequently contributed to the outbreak of war in 1967.⁴⁴

Still under pressure to meet the demands of increasing immigration and refugee influx and in an atmosphere of rejuvenated hostility due to the Suez War and the formation of the United Arab Republic (UAR), Israel proceeded with its National Water Carrier project. Concurrently, Jordan, backed by Syria, Egypt, Lebanon, Saudi Arabia, and the United States, began construction of the East Ghor Main Canal project.⁴⁵

Israel started by diverting water from the Jordan River and Lake Galilee to the coastal plain and the Negev desert, thus increasing its water supply by one-fifth.⁴⁶ Its goals were to extend irrigation further southward and stabilize the water economy of the coastal plain. Meanwhile, Jordan proceeded with the construction of: (1) two dams on the Yarmouk River for storage and hydroelectricity, (2) a West Ghor Canal together with a siphon across the Jordan River to connect it to the East Ghor Canal, (3) seven dams to utilize seasonal flow alongside the Jordan River, and (4) pumping stations to protect against floods and conserve water runoff.⁴⁷ The purpose of the project was to extend irrigated agriculture, double yields, and provide employment. To reiterate, Jordan was attempting to deal with explosive population growth while simultaneously confronted with the fact that it was heavily dependent, population growth or not, on agriculture for economic growth and prosperity. By 1964, three of the project's four stages were complete.

⁴⁴ Hillel, *Rivers of Eden*, p. 163.

⁴⁵ Murakami, *Managing Water for Peace*, pp. 295-297.

⁴⁶ Lowi, *Water and Power*, p. 118.

⁴⁷ Murakami, *Managing Water for Peace*, p. 296.

F. WATER SCARCITY AND THE SIX DAY WAR

As Israel's and Jordan's projects progressed from 1955 to 1964, tensions grew. The Arab states protested to the United States and the UN, arguing that Israel was in violation of international law and the rights of the inhabitants of the basin. Syria, Egypt, Jordan, Lebanon, and the Palestinians in general, believed that Israel's project was a threat to their collective security – the National Water Carrier would improve Israel's economic potential and industrial power, including its ability to absorb more Jewish immigrants.⁴⁸ In 1964, the Arab Committee convened and considered direct military attack on Israel to stop construction on the Carrier.⁴⁹ Jordan, Egypt, and Lebanon disapproved of military attack and instead supported diversion of the Hasbani and Baniyas rivers into the Yarmouk. Syria, on the other hand, argued that the decision to divert was “an evasion of the duty to fight Israel in order to recover Palestine.”⁵⁰ Israel said it would act to defend its “vital rights” and consequently began pumping water from Lake Galilee in May 1964. Israel believed that “the Arabs’ argument was not about water but an argument which denied Israel’s right to exist.”⁵¹

Jordan, Egypt, Syria, and Lebanon jointly started work on the diversion project in May of 1965. Assuming that Israel might respond with military force, all of the Arab states agreed that aggression against any one of them would constitute aggression against all of them.⁵² In May, Israeli and Syrian patrols exchanged gun fire. On July 14th, 1966, the Israeli air force bombed Syrian construction vehicles, and an air battle took place over the Baniyas River. On August 15th, 1966, Syria and Israel exchanged fire on Lake Galilee.

⁴⁸ Ibid.

⁴⁹ Ibid., pp. 296-297.

⁵⁰ Hillel, *Rivers of Eden*, pp. 162-163.

⁵¹ Lowi, *Water and Power*, p. 123.

On April 2nd, 1967, a fire fight took place in the DMZ. On April 7th, 1967, the Israeli air force bombed the Golan Heights area and attacked the diversion dam works at Marjouyen and Maqarin, which were located in the Golan Heights and Syria/Jordan, respectively.⁵³

All of this is offered to make the point that Israel's and Jordan's acute need for water helped to entangle the two parties in all out war. The same may be possible in the next two decades, as the pressure to acquire new supplies of water surpasses that which weighed on Israel and the Arabs just before the Six Day War of 1967. The potential for future conflict is only heightened by the fact that the Middle East continues to suffer from serious instability.

In any event, occupation of the Golan Heights, following the Six-Day War, gave Israel control of the Banias River, and later in 1978, the Hasbani River. In addition, Israel controlled half of the length the Yarmouk River, compared to 10km before the war, and assumed management over and control of the aquifers of the West Bank.⁵⁴ The conflict did not stop, however. The Palestine Liberation Organization (PLO), formed in 1964, started attacking Israeli settlements in the Jordan valley.⁵⁵ These attacks included raids against water installations, which were executed to acquire water and then prevent Israel from pumping needed supplies. Israel responded by destroying the East Ghor Canal.⁵⁶

⁵² Ibid.

⁵³ For a detailed description of the skirmishes see Naff and Matson, eds., *Water in the Middle East*, pp. 287-288.

⁵⁴ Murakami, *Managing Water for Peace*, p. 297.

⁵⁵ Baruch Kimmerling and Joel S. Migdal, *Palestinians: The Making of a People* (Massachusetts: Harvard University Press, 1997), pp. 208-239.

⁵⁶ Murakami, *Managing Water for Peace*, p. 297.

G. 1967 - 1998

Since 1967, Israel has completed the National Water Carrier System and has worked on several non-conventional water supply projects, such as wastewater treatment, controlled mining of the West Bank's aquifers, desalination, and drip irrigation. (Israel's efforts to meet increasing water demand will be discussed in the following chapters). Additionally, Israel continues to divert the Yarmouk River and place the extra water in Lake Galilee. Syria, incidentally, diverts water northward for agriculture and because it objects in principal, as pointed out in the introduction, to Israel's plan to build any dams in still-disputed territory. Consequently, Jordan has been without much needed water, which originates in the Yarmouk River. Despite the completion of the first stage of the East Ghor Canal project in 1982 – which delivered some additional water, and the Jordanian-Israeli Peace Accord of 1994 – which proposed cooperation on dam projects on the Yarmouk River that would enable Jordan to store water for future use, Jordan, in both rural and urban sectors, is rationing water.⁵⁷ While the aim of this thesis is to assess Israel's dilemma and the Palestinians' predicament, the following statistics are instructive, even ominous, and serve to illustrate how complicated the water issue will become when Jordan's future water shortages are added to the scarcity equation.⁵⁸

- Jordan's population has been growing 3.7 percent per year. This is expected to continue for the next two decades. In twenty years, its population will more than double to 6.8 million.

⁵⁷ Hillel, *Rivers of Eden*, pp. 173-174.

⁵⁸ For the demographics concerning Jordan see Hillel, *Rivers of Eden*, p. 173-175. For a discussion of living standards, levels of income, and their subsequent affect on water demand see Alan Richards and John Waterbury, *A Political Economy of the Middle East*, 2nd ed., chp. 6.

- If living standards are expected to remain the same, then the demand for water will double in the next twenty years.
- Living standards, however, are expected to increase and consequently so will agricultural demand.
- By 2020, Jordan's absolute water deficit will be 1,300mcm per year – presently it is 138mcm.

In summary, the Johnston mission of 1953-1955 failed because of geopolitical and security-related concerns held by Israel, Jordan (and the Palestinians), and Syria. To the Zionists, water resources were tantamount to the continued existence of the Jewish state. Access to water enabled Israel to meet the agricultural and developmental needs of a growing economy and a rapidly growing immigrant population. Water ensured self-sufficiency, and therefore, security. As for the Arabs, much of their concern focused on the loss of Palestine and its implications. Moreover, collaborating with the Jews meant implicit recognition of the State of Israel – a state that had been established, and in the view of its enemies, through “conquest and deceit.”⁵⁹

Negotiations since 1991, beginning with the Madrid Peace Talks, have failed to achieve cooperation for similar reasons. While all Arab nations originally involved in the dispute have internationally recognized Israel, they still harbor a commitment to regain Palestine and a desire take back the Golan Heights (Syria) and West Bank (the PLO). Israel is as concerned about water and its national security as it has ever been. As for Jordan's water crisis in 1964, the Palestinians – and increasingly the Israelis and

⁵⁹ Lowi, *Water and Power*, p. 106.

Jordanians – are faced with a similar circumstance. The point is, that unless the water needs of the Arabs are met, the dispute will continue and may result in armed conflict.

III. THE PROBLEM

Supplies of renewable water are limited whereas demand is rising rapidly in the Middle East (see Tables 2-1 and 2-2). In 1990, only six Middle East countries had a per capita supply of more than 1,000m³ per capita per year, the minimum amount theoretically required to sustain agriculture and therefore life.⁶⁰ For the Middle East as a whole, per capita supply in 2020 is projected to be 667m³ per year, equivalent to 30 percent of a comparable estimate for Asia, 25 percent for Africa, and 15 percent of that for the whole world.⁶¹ The most striking aspect of these projections is the rapidity with which scarcity has risen. In one life time, supply per capita will have fallen by over 80 percent from 3,340m³ in 1960 to 667m³ in 2020.⁶² Because of accelerating population growth, urbanization, and industrialization, water demand, and consequently pollution, have increased. The World Bank estimates that in Jordan and the West Bank renewable freshwater supplies will barely cover basic human needs by the year 2005.⁶³ For instance, the minimum water required to sustain human life is approximately 10m³ per person per year.⁶⁴ A reasonable supply to maintain health is approximately 40-80m³ per year.⁶⁵ In Israel, Palestine, and Jordan, however, annual domestic use alone averages approximately 150m³ or more.⁶⁶

⁶⁰ This is known as the Falkenmark measure of water scarcity. Falkenmark estimated that a country was "water-stressed" if it had less than 1,000 cubic meters of water per person per year. The calculation includes an allocation for agriculture as well as estimates for domestic and industrial/municipal use. Cited in Richards and Waterbury, *A Political Economy of the Middle East*, 2nd ed., p.162.

⁶¹ G. J. Young, *Global Water Resource Issues* (Cambridge: Cambridge University Press, 1994), pp. 122-124.

⁶² Berkoff, *A Strategy for Managing Water*, p. 68.

⁶³ Ibid., pp. 2-3.

⁶⁴ Richards and Waterbury, *A Political Economy of the Middle East*, 2nd ed., p. 162.

⁶⁵ Ibid.

⁶⁶ Berkoff, *A Strategy for Managing Water*, p. 13.

Table 2-1. Renewable Water Supply Per Capita (1960 - 2020), Middle East

Country	1960	1990	2020
Algeria	1,704	737	354
Egypt	2,251	1,112	1,032
Iran	5,788	2,152	1,032
Iraq	14,706	5,285	2,000
Israel	1,024	467	311
Jordan	529	224	91
Morocco	2,560	1,185	651
S. Arabia	537	156	49
Syria	1,196	439	161
W. Bank	n.a.	807	615
MENA ^a	3,340	1,436	667

^a MENA: Middle East – North African countries. Those not shown, in the interest of brevity, include: Bahrain, Lebanon, Libya, Malta, Oman, Qatar, Tunisia, UAE, and Yemen.

n.a. Not available

Source: compiled from Gabbay, *The Environment in Israel*, pp. 17-18 and 21-22; Berkoff, *A Strategy for Managing Water*, p. 68.

Table 2-2. Water Supply versus Demand in the Middle East

Country	Supply (bcm)	Demand (Percent of Supply)		
		1990	2005	2020
Algeria	18.40	16	20	26
Egypt	58.30	97	101	106
Iran	117.5	39	44	51
Iraq	100.0	43	49	53
Israel	1.84	94	118	141
Jordan	0.75	101	140	253
Morocco	29.70	37	43	52
S. Arabia	2.20	106	110	114
Syria	5.50	61	67	72
W. Bank	0.81	100	131	139
MENA ^a	348.3	51	56	62

^a MENA: Middle East – North African countries. Those not shown, in the interest of brevity, include: Bahrain, Lebanon, Libya, Malta, Oman, Qatar, Tunisia, UAE, and Yemen.

Source: compiled from Gabbay, *The Environment in Israel*, pp. 17-18 and 21-22; Lowi, *Water and Power*, pp. 30-32, 159, and 186-187; Berkoff, *A Strategy for Managing Water*, p. 69.

Add to diminishing supplies the political tension in the region – specifically, that between Israel and the PLO, which has precluded any comprehensive agreement over access to and use of water – and the forecast through the year 2020 is dim.⁶⁸ It is estimated that by 2020, if fully mobilized, the supply of renewable resources from surface and groundwater, plus the supply from nonrenewable groundwater resources, plus any fresh water acquired from the very costly process of desalination, will barely cover basic human needs in Israel, Palestine, and Jordan. The point is that absolute water deficits are inevitable unless conservation steps are taken and alternate sources are procured. Applying some quantitative analysis to World Bank and Middle East Water Commission figures on renewable resources per capita, what is striking is the rapidity with which scarcity is rising. Between 1960 and 2020 (i.e., one life time), supply per capita in Israel, Palestine, and Jordan will have fallen by 69.6 percent, 47.2 percent, and 82.8 percent, respectively.⁶⁹ Confounding the situation is the fact that not all renewable water supplies can be retrieved at an affordable, much less acceptable, cost. In other words, the volume of economically available water is much lower than the estimates by the World Bank and the Middle East Water Commission. This is because conventional water sources, such as streams, lakes, aquifers, rivers, river basins,⁷⁰ are increasingly depleted by population growth and industrialization. As a result, non-conventional sources (i.e., treated waste water, water imports, and desalination) will become more important. Unfortunately, these latter sources are very expensive (Table 2-3).

⁶⁸ It is worth noting that 35 percent of renewable water supplies are provided by rivers flowing from outside the region and – to a varying extent – these are vulnerable to abstraction by upstream riparians. Within the region, rivers and aquifers crossing national borders could lead to acute conflicts. Two-thirds of all Arabic speaking people depend on rivers flowing from non-Arab countries. See Hillel, *Rivers of Eden*, pp. 36-40.

⁶⁹ Biswas, Kolars, Murakami, Waterbury, Wolf, *Core and Periphery*, pp. 13-15 and Berkoff, *A Strategy for Managing Water*, pp. 68-69.

⁷⁰ River basin: The land area from which water drains into a river.

Table 2-3. Unit Costs of Nonconventional Water Resources, Middle East (US\$ per m³)

Treated Waste Water	0.12 – 0.40
Desalination	1.0 – 1.50
Water Imports	0.8 – 1.00
Peace Pipeline ^a	0.84 – 1.07

Source: Berkoff, *A Strategy for Managing Water*, pp. 27-29; Murakami, *Managing Water for Peace*, p. 45.

^aThe “Peace Pipeline” is a transnational pipeline/canal structure, proposed by Turkey in 1989, that would link the water of the Seyhan and Ceyhan rivers located in southeastern Turkey to the Gaza Strip, West Bank, Israel, southern Syria, Jordan, Egypt, and Saudi Arabia.

Desalination, for instance, costs approximately US\$ 1.0-1.5 per m³ or US\$ 2,000-4,000 per acre foot.⁷⁰ And, despite the fact that there is an unlimited supply of sea water which would serve to augment Israeli and Gaza Strip supplies, it is not useful to the 900,000 Palestinians in the West Bank, or inland Jordan who is already one of the poorest countries in terms of water and who is in need of still more to support an additional 350,000 Palestinian refugees that fled from Kuwait following the Gulf War. As the Berkoff points out, “given its high costs, desalination is almost wholly confined to supplying industrial and domestic users in rich countries...Cost will be the constraint, in particular for inland cities and poor populations, such as the Palestinians.”⁷¹ As for expenses associated with new supplies produced by waste water treatment and the import of water, cost estimates range from US\$ 0.40-0.45 and US\$ 0.8-1.0 per m³, respectively.⁷² Having to turn to these sources in the face of accelerating population

⁷⁰ Berkoff, *A Strategy for Managing Water*, p. 29.

⁷¹ Ibid., p. 10.

⁷² Ibid., p. 29.

growth and increasing industrialization and urbanization will put Israel, Palestine, and Jordan in a squeeze. One possible solution is, of course, cooperation.

As previously mentioned, however, political tension has precluded cooperation, much less any comprehensive agreement, and has caused each country to unilaterally implement or arrange with other countries development projects. As a result of unilateral action, the region's demand for water resources exceeds at least 90 percent of available renewable supply (Table 2-4).⁷³

Table 2-4. Water Supply versus Demand in the Jordan River Basin (1994)

<u>Country/Territory</u>	<u>Supply (mcm/yr)</u>	<u>Demand (mcm/yr)</u>	<u>% Withdrawn</u>
Israel	1,840	1,950	98.9
Jordan	862	1,045	121.0
West Bank	615	730	118.6
Syria	5,500	3,850	70.0

Source: compiled from Lowi, *Water and Power*, pp. 30, 159, and 186-189; Berkoff, *A Strategy for Managing Water*, pp. 68-69.

Israel, Jordan, the West Bank, and Syria currently use between 70 percent (Syria) and more than 100 percent (Jordan, the West Bank, and Israel) of their annual renewable fresh water supply. Gaza exceeds its renewable supply by 50 percent every year, resulting in serious saltwater intrusion.⁷⁴ Unilateral development, in turn, has been

⁷³ Israel's average annual renewable fresh water supplies amount to 1,856mcm to 1,970mcm per year. In 1996, Israel consumed 98.9 percent of its renewable fresh water resources, or 1,950 mcm. As for Jordan, average annual renewable fresh water supplies are approximately 862mcm per year; in 1996, Jordan consumed a total of 1,045mcm, or 121 percent of available supplies. In 1996, the Palestinians consumed exactly 125mcm, or 100 percent of the amount allocated to them. See Lowi, *Water and Power*, pp. 30-31, 159 and 186-189.

⁷⁴ Biswas, Kolars, Murakami, Waterbury, Wolf, *Core and Periphery*, pp. 13-15.

politically volatile because it has threatened the resources of a neighbor, and thus each country's national security.

Israel and the Palestinians have had their differences over water. Israel has been blamed for stealing Palestinian water by unilaterally pumping it from the Yaqon-Tanimim, Nablus-Jenin, and Eastern aquifers of the West Bank. The Palestinians have also accused Israel of preventing them from drilling new, badly needed wells in the West Bank, thus keeping the water of the aquifers for itself. The Palestinians have also protested to the UN, the World Bank, and the Middle East Water Commission that Israel pumps up from 85 to 95 percent of West Bank water resources to Israel, Jerusalem, and Jewish settlements. As a result, the Palestinians assert, they are left with only 118mcm of water, or 98m³ per person, per year for their own needs – less than one-fifth of the West Bank's water resources and one-third of the Palestinians' predicted annual water needs for the next decade.⁷⁵ The impasse appears as though it will continue for the foreseeable future because, despite the fact that the aquifers are fed as well by rainwater that falls on Israel proper, the Palestinians contend that the aquifers are fed primarily by rain that falls on Arab territory, and as such are theirs. Consequently, Palestinians refuse to consider suggestions that they acquire water from outside sources, such as that amount contributed by Jordan or water imports, until they are allocated the entire supply that they claim is theirs. For its part, Israel tends to ignore the Declaration of Principals on Interim Self-Government agreed upon in Oslo, Norway on 13 September 1993 (Oslo I). The accord produced proposals for an inter-state regional economic development plan, including several water-related proposals that emphasized cooperation such as the creation of a Palestinian Water Administration Authority (PWAA) and a Water Development

Programme.⁷⁶ The program included: a mode of cooperation on the management of water resources in the West Bank and Gaza Strip; proposals for studies on each party's water rights; and proposals for equitable use of these joint resources during the interim period and beyond. Despite the fact that differing interpretations of the intent behind what was written down in Oslo I were clarified in the Taba Agreement of 28 September 1995 (Oslo II), also known as the Israeli-Palestinian Interim Agreement, and the fact that Israel recognized the Palestinian claim to water rights in the occupied territory, the decision as to the exact amount of water for both parties was postponed until final status talks. Moreover, while Netanyahu's predecessors in the Labor government, lead by Yitzak Rabin, did concede Palestinian water rights, Netanyahu and his negotiators insist that water resources must stay under Israeli control.⁷⁷

While Israel did agree to make available an additional 28.6 mcm per year for domestic use by Palestinians, and from its own water system an additional 9.5 mcm/yr., including 5 mcm for Gaza, there has been limited implementation of the water accords.⁷⁸ The following facts are instructive:⁷⁹

- In 1996, Israel supplied only 3mcm to Gaza and another 1mcm to Hebron.

⁷⁵ Lowi, *Water and Power*, p. 189.

⁷⁶ Bickerton and Klausner, *A Concise History of the Arab-Israeli Conflict*, 3rd ed., p. 278-282.

⁷⁷ Ilene R. Prusher, "Water Lies at the Heart of the Mideast Land Fight," *Christian Science Monitor*, 17 April 1998, p. 2.

⁷⁸ Alwyn R. Rouyer, "The Water Issue in the Palestinian-Israeli Peace Process," *Survival* Vol. 39, No. 2 (Summer 1997), pp. 72-73.

⁷⁹ See Jad Isaac and Jan Shelby, "The Palestinian Water Crisis: Status, Projections and Potential for Resolution," *Natural Resources Forum* Vol. 20, No. 7, 1996, p. 25; Deborah Horan, "Palestinians and Israelis Lock Horns Over Water," *Inter Press Service*, 20 March 1998, p. 1; and also, Prusher, "Water Lies at the Heart of the Mideast Land Fight," p. 1.

- Israel's National Water Authority still charges Palestinians the real cost of the water, not the state-subsidized, less expensive rate charged to Israeli settlers and citizens.
- 40 percent of the Arab villages in the West Bank have no running water at all.
- 120 villages, or about one-fifth of the Arab population in the West Bank, are not connected to the water network.
- There has been no further definition of Palestinian water rights. That is, while Israel did formally recognize Palestinian water rights, the negotiations to sort out the precise meaning of these rights has been postponed until permanent-status talks. Moreover, any talk of water rights smacks of Palestinian sovereignty, which Israel is not prepared to discuss until negotiations begin on a final peace settlement. In the interim, Israel wants to limit negotiations to equitable water distribution, while retaining sole control of the West Bank's aquifers.
- Israel continues to use the same amount of West Bank water as it did before the Taba Accord. Palestinians consume approximately 13 gallons per day per capita, compared with 65-75 gallons consumed by Israelis. In fact, the rate of consumption has increased two-fold since late 1996 because Jewish settlements have been expanding. None of the 144 Israeli settlements in the West Bank have water shortages, most homes have gardens and some even have swimming pools. Where the average Palestinian villager uses 50 liters per day, settlers use 250. This phenomenon shows no sign of abating.

The point here is that for the foreseeable future Israel's position is not going to change; that is, a more cooperative or conciliatory approach is not in the offing. In general, the new air of cooperation promised by Oslo II has become clouded since the change of government in Israel. Benjamin Netanyahu possesses a tougher attitude toward the Palestinians, promising to put Israeli security, including that of its water supply, first. The following statement by Martin Sherman, member of the ruling Likud party, accurately summarizes Israel's present position with respect to West Bank water resources:

Following through with the proposals made in the DOP and Taba Agreement would in effect be yielding its [Israel's] capacity to supply the country with water. Rapid Arab population growth, because of an influx of returning refugees, would overwhelm the already inadequate West Bank sewage system and the pollutants running westwards would damage Israel groundwater sources. Israel should retain authority over urban planning, water management and immigration policy in the West Bank. In my view, proposals to manage water resources jointly could only lead to conflict and are doomed to failure. The only realistic approach for Israel is to keep control over the West Bank and Golan Heights.⁸⁰

Further amplification comes from Ariel Sharon, Israel's new Minister of Infrastructure beginning in 1995, who stated in April of 1998:

We [Israel] intend to hold large swaths of the West Bank not only to create security zones, but to make sure Israel's water sources aren't jeopardized. The Palestinians,

⁸⁰ See Prusher, "Water Lies at the Heart of the Mideast Land Fight," p. 2. And also, Rouyer, "The Water Issue in the Palestinian-Israeli Peace Process," pp. 69-70.

lacking in technical expertise, would damage water sources handed over to them...In just two years, they managed to destroy the aquifer in Gaza by over-pumping. The danger is that they will over-exploit our water dramatically.⁸¹

Meir Ben-Meir added:

If Israel kept up with Palestinian demand for water, then Israel would have to harm their common water table or divert Israeli water resources to the Palestinians...I maintain that the Palestinian water problem is not due to settlements or sovereignty, but simple economics and under-development...Two women in the kitchen spoils the soup.⁸²

A closer look at Israel's water dilemma and the Palestinians' predicament are instructive because they help to explain the difficulty each side has in cooperating with the other, and why the prospect for peace is dismal.

⁸¹ Prusher, "Water Lies at the Heart of the Mideast Land Fight," p. 1.

⁸² Horan, "Palestinians and Israelis Lock Horns Over Water," p. 2.

IV. ISRAEL'S DILEMMA

In Israel, demand for water is exceeding supply. Excessive demand is being driven by increasing population growth and the expansion of the urban and industrial sectors of Israel's economy. The annual sustainable yield of renewable fresh water in Israel has been on average approximately 1.5bcm (billion cubic meters) per year. In 1969, the withdrawal rate was 1.6bcm. By 1987 it was up to 1.950bcm. By 1993, Israel started to conserve water and, in fact, reduced consumption to 1.679bcm.⁸³ The figures appear to show a favorable trend; that is, with a little "belt tightening" Israel has been able to meet its needs. However, the statistics are deceptive because despite the enormous savings in water used for agricultural irrigation (overall savings in the farm sector was approximately 39 percent in 1992⁸⁴), little future water savings can be made by increasing efficiency. In other words, Israel is as efficient with water use as it is ever going to get – the law of diminishing returns is at work here. Furthermore, Israel is currently using approximately 98.9 percent of its total renewable water resources, and consumption is on the rise due to population growth, urbanization, and to a lesser extent, industrialization.⁸⁵ As mentioned in the introduction, Israel's water consumption level

⁸³ Murakami, *Managing Water for Peace*, pp. 205-211. And also, Shashanon Gabbay, *The Environment in Israel* (Israel: Ministry of the Environment, 1994), p. 17.

⁸⁴ In the late 1970s and early 1980s, Israel was faced with a growing demand for water from the urban and industrial sectors of its economy. Experiments were undertaken to reuse urban waste water through the Dan Waste-Water Recovery project, but the purification system was too inefficient in producing necessary quantities of water. Desalination and distillation systems were tried, but they failed as well. Consequently, the only way to obtain water was to divert it from one use to another; that is, from agriculture to municipal/industrial and domestic use. In 1960, Israel's agriculture sector consumed approximately 81.2 percent of the total water available. As of 1996, that number was only 61 percent. On the other hand, municipal/industrial use climbed from 4.1 to 11 percent; and domestic use increased from 14.7 percent in 1960 to 28 percent as of 1996. See Murakami, *Managing Water for Peace*, pp. 207 and 214; Lowi, *Water and Power*, pp. 30-31; and also, Gabbay, *The Environment in Israel*, p. 17.

⁸⁵ In 1994, Israel's Ministry of the Environment released figures concerning water consumption increases heretofore unadvertised: between 1992 and 1993 alone, agricultural consumption increased by 10.2 percent,

depends heavily on water resources of the West Bank which it shares with the Palestinians. Roughly 30-33 percent of Israel's total water resources come from the West Bank and more importantly, approximately 50 percent of its drinking water. Given the population growth projections, this trend is bound to continue and prove more divisive as time proceeds.⁸⁶

High and low population growth estimates for Israel, Jordan, the West Bank, and the Gaza Strip based on 1994 data illustrate that the relationship between water availability and population is an inverse one. As population growth increases due to an increase in a country's birth-rate and immigration, there is a concomitant absolute water deficit in that particular country. For instance, assuming low water demand (i.e., urban use grows at current per capita usage – 537 cubic meters) and a low rate of population growth that assumes that one million Israeli immigrants reached Israel by 1995 and a crude birth rate (CBR)⁸⁷ of 21, Israel will confront an absolute water deficit (current annual natural potential minus projected demand) of 400mcm in the year 2000 and 600mcm in 2020 (Table 3-1).⁸⁸ Assuming a high water demand (i.e. an additional 100

industrial demand grew by 3.7 percent and domestic use rose by 12 percent. According to the Ministry, while efforts to reduce agricultural consumption have been successful, demand is expected to continue to rise due to the growth of Israel's population and economic/industrial output. See Gabbay, *The Environment in Israel*, p. 18.

⁸⁶ Consider the following resource supply and population growth projections: In 1991, Israel's population was 4.4 million, water consumption – including that from the Golan Heights and Jewish settlements in the West Bank – was 2.1-2.2 bcm, while the renewable fresh water supply in Israel was only 1.950bcm. In other words, Israel was using 112 percent of the available fresh water – it procured the balance by diverting water from the Arabs in the West Bank. In 2015, Israel's population is projected to be 6.4 million which correlates to a water consumption rate of 2.8-2.9bcm per year. By 2015, the available renewable fresh water supply in Israel will only amount to 2.06bcm per year. Israel intends to withdraw more water from the West Bank and divert more water from the Jordan River, away from Jordan. See Thomas Naff, "The Jordan Basin: Political, Economic, and Institutional Issues" in *Country Experiences with Water Resources Management: Economic, Institutional, Technological and Environmental Issues*, World Bank Technical Paper no. 175 (Washington, D.C.: World Bank, 1992).

⁸⁷ CBR is the quotient of the number of births and the total population; here 21 per 1000. See Richards and Waterbury, *A Political Economy of the Middle East*, 2nd ed., pp. 78-79.

⁸⁸ Biswas, Kolars, Murakami, Waterbury, Wolf, *Core and Periphery*, p. 39.

cubic meters per capita per year for urban and industrial use, also known as the minimum water right⁸⁹) and a high rate of population growth that assumes that two million Israeli immigrants will arrive in Israel by 2000 and a CBR of 26, Israel will confront an absolute water deficit of 500mcm by 2000 and 800mcm by 2020 (Table 3-1).⁹⁰

Table 3-1. Projected Population and Water Demand, Israel (1994)

Entity	Population (millions)	Water Needs Low Demand (mcm/yr)	Water Needs High Demand (mcm/yr)	Low/High Water Deficit (mcm/yr)
<u>1 million</u> <u>Immigrants:</u>				
2000	6.44	2000	2000	400/400
2020	8.85	2200	2200	600/600
<u>2 million</u> <u>Immigrants:</u>				
2000	7.46	2100	2100	500/500
2020	10.01	2400	2400	800/800

Source: Biswas, Kolars, Murakami, Waterbury, Wolf, *Core and Periphery*, p. 40.

Another factor contributing to water scarcity is the rapid rate of urbanization. For the most part, urbanization has been caused by the natural growth of present urban populations and rural-urban migration. Tel Aviv alone may reach 2.28 million by 2000.⁹¹ In 1952 the percent of Israel's population in urban areas like Tel Aviv and Jerusalem was

⁸⁹ Richards and Waterbury, *A Political Economy of the Middle East*, 2nd ed., pp. 78-79.

⁹⁰ Biswas, Kolars, Murakami, Waterbury, Wolf, *Core and Periphery*, pp. 39-40.

⁹¹ Ibid., p. 41.

65 percent. In 1990, it was 92 percent; in 1996, 94 percent.⁹² As the cities grow, there is not only increasing stress on housing and infrastructure, but also on water resources. As this urbanization increases, domestic water needs will increase at an even faster rate, and water pollution levels will rise. Ultimately, the pressure on natural water supplies will be higher and the need to appropriate water from the agricultural sector will accelerate.

Israel faced this very same dilemma in the late 1970s and early 1980s as the demand for water increased due to increasing urbanization and industrialization. Israel had to divert water from the agricultural sector, which still accounts for approximately 61 percent of Israel's total water usage (which is itself a response to increasing population growth), to municipal and industrial sectors. The cycle is quite deleterious – water is diverted for city and industry use, but less is left for agriculture while population growth increases.

Three solutions have been attempted. The first, reuse of urban waste waters through the Dan Waste-Water Recovery project to augment diminishing supplies, failed because it was too difficult to remove the contaminants.⁹³ Economical solutions to the purification process have not been forthcoming so far because current contaminant-removal technology is simply too expensive to implement via such large schemes like the Dan Waste-Water project.⁹⁴ The second, water desalination, has been deemed too

⁹² Ibid.

⁹³ Murakami, *Managing Water for Peace*, p. 214.

⁹⁴ Measures to decrease municipal and industrial water use would lead to reductions in the amount of waste water and, consequently, also to reductions in the size and costs of collectors, pre-treatment/treatment plants, and disposal systems. Based on the information presented in this thesis, however, such measures to reduce use, while helpful and responsible, still won't meet future demands. In any event, plans for using treated waste water as a source of supply should be pursued. Economical solutions are possible if only water would be treated as an economic good. In other words, eliminate subsidies which would then allow water prices to naturally rise, through market forces, to its actual economic value. In general, water pricing is an important way of improving water allocation and encouraging users to conserve scarce resources. Prices which actually reflect water's economic, or scarcity value give information to users, which they

expensive except for specific projects.⁹⁵ Presently, however, progress is being made. Up until now, desalination plants have been made solely out of copper-nickel alloys. As a result, producing one acre foot of fresh water cost approximately US\$ 2,000-4000, depending on the exact structure of the desalination plant. Right now, Israel is experimenting and working in conjunction with Reynolds Aluminum Co. of the United States in the production of an aluminum desalination plant, which would reduce the amount it costs to produce one acre foot of fresh water to US\$ 600.⁹⁶ This is a 70 to 85 percent savings. However, the design is as of yet unproven, and the first prototype will be tested in Singapore. The third solution has approached the problem from a different angle. In order to meet the increasing demand for food, Israel has been importing food at an increased rate of 1.8 percent per year.⁹⁷ While this has abated the requirement to divert water for agricultural use, urbanization and industrialization increasingly consume whatever amounts are conserved.

As for the growing demand for water due to industrialization, annual GDP growth in Israel has been approximately 3.9 percent. Manufacturing growth has been increasing at a rate of 6.7 percent per year, industry 5.8 percent per year.⁹⁸ To put the impact increasing industrialization has had on water supplies into perspective, consider the

could use to make choices regarding water consumption and use. In other words, water pricing can affect water use efficiency, at both the individual and social levels. See Richards and Waterbury, *A Political Economy of the Middle East*, 2nd ed., pp. 163-164; Ismail Serageldin, *Water Supply, Sanitation, and Environmental Sustainability: the Financing Challenge* (Washington, D.C.: World Bank, 1994); and Ariel Dinar and Ashak Subramanian, *Water Pricing Experiences: An International Perspective*, World Bank Technical Paper no. 386 (Washington, D.C.: World Bank, 1997).

⁹⁵ Israel's Water Commissioner, Meir Ben-Meir, has said that desalination in large enough quantities to matter is not yet an option that Israel's treasury wants to authorize. See Horan, "Palestinians and Israelis Lock Horns Over Water," p. 3. And also, Serageldin, *Water Supply, Sanitation, and Environmental Sustainability: the Financing Challenge*, pp. 11-12.

⁹⁶ Assistant Head Engineer-Desalination Project of Reynolds Aluminum Company, interview by author, 1 May 1998.

⁹⁷ Richards and Waterbury, *A Political Economy of the Middle East*, 2nd ed., p. 70.

⁹⁸ *Ibid.*, pp. 63-66.

following. In 1973, annual water consumption in Israel was 1.565mcm. 1.180mcm (75.4 percent for agriculture); 288mcm (18.4 percent for domestic use), and 97mcm (6.2 percent for industry).¹⁰⁰ It was predicted then that by 1992 an additional 8.1mcm would be required for agriculture, 20.5mcm for domestic use, and 28.5mcm for industry. In fact, by 1992, an additional 7.4mcm, **23.4mcm**, and **34.5mcm** was required, respectively. And, between 1992-1993, industrial demand continued to expand, growing by 3.7 percent, from 102.7mcm to 106.5mcm.¹⁰¹

All of this is to say that Israel is going to be in quite a bind in the years to come. To meet their demand, Israel intends to use improved technology for contaminant removal and intensive sea water desalination. Israel does, however, assert that it cannot relinquish any of the major water resources like the head waters of the Jordan River, which are located in disputed territory, and the aquifers located under the West Bank where approximately 1.2 million Palestinians, clamoring for their equal share, reside. In fact, the West Bank and the Golan Heights are crucially important to the economy and security of Israel. Israel is dependent on the West Bank for some 522mcm per year of its water supply out of a total of 1.656bcm, nearly one-third of the area's potential annual renewable water supply.¹⁰² The 522mcm that Israel withdraws represents 82.6 percent of the annual available water (632mcm) in the aquifers located under the West Bank, leaving the Palestinians with 110mcm.¹⁰³ Israel is particularly concerned that over-pumping of the West Bank aquifers will cause salt-water intrusion of the entire aquifer system.¹⁰⁴ Because of the delicate hydrodynamic balance between fresh and saline water, coupled with the inexorable growth of Israeli water consumption, Israel intends to continue to prevent substantial economic development of the Arab sector of the West

¹⁰⁰ Murakami, *Managing Water for Peace*, p. 207.

¹⁰¹ Gabbay, *The Environment in Israel*, p. 17.

¹⁰² Biswas, Kolars, Murakami, Waterbury, Wolf, *Core and Periphery*, pp. 12-14.

¹⁰³ Ibid.

¹⁰⁴ John Kolars, "The Course of Water in the Arab Middle East," *American-Arab Affairs* No. 33 (Summer 1990), p. 67.

prevent substantial economic development of the Arab sector of the West Bank. In fact, Israel's Water Commission¹⁰⁴, in an effort to protect the quantity and quality of the water resources consumed in Israel proper, set forth a policy which allows West Bank Arabs a total consumption of 125mcm per annum,¹⁰⁵ or, depending on annual rainfall, only 14-18 percent of total availability. Stringent measures have been adopted by Israel since 1967 to ensure that this policy is respected. First, no wells can be drilled on the West Bank without permission from Israel's Water Commission. In fact, no Palestinian Arab individual or village has received permission to drill a new well for agricultural purposes since 1967.¹⁰⁶ Requests for drilling wells destined for domestic use have been entertained, but as Israel's Water Commissioner, Meir Ben-Meir, has stated, "if their [Palestinians'] demand is for drinking water, we must say yes...But we are not going to stop irrigating our orchards so they can plant new ones."¹⁰⁷ Second, for the agricultural activities of West Bank Arabs, only existing uses of water are recognized. To Meir Ben-Meir, "existing uses" mean that amount consumed in 1967-68, or 100mcm.¹⁰⁸ In fact, Ben-Meir suggests that the Palestinians reduce their allocations for agriculture.¹⁰⁹ Third, the technology necessary to fully exploit the waters of the western basin remains in Israeli hands. Fourth, West Bank Arabs are not allowed to use water for agricultural purposes after four o'clock in the afternoon.¹¹⁰ Fifth, strict limits are placed on the amount of water that can be pumped annually from each well. Meters fixed to the wells

¹⁰⁴ Israel's Water Commission is composed of two other divisions. The first is the Mekorot, also known as Israel's National Water Authority. The second is Tahal, or the Water Planning for Israel Company. Mekorot is responsible for irrigation and water supply project construction. Tahal handles overall planning and design of water development projects.

¹⁰⁵ Uri Davis, Antonia Maks and John Richardson, "Israel's Water Policies," *Journal of Palestine Studies* Vol. 9, No. 2 (Winter 1980), p. 13.

¹⁰⁶ Horan, "Palestinians and Israelis Lock Horns Over Water," p.1.

¹⁰⁷ Ned Temko, "Water - Toughest Issue on West Bank," *Christian Science Monitor*, 18 September 1979, p. 11.

¹⁰⁸ Jeffery D. Dillman, "Water Rights in the Occupied Territories," *Journal of Palestine Studies* Vol. 19, No. 1 (Autumn 1989), p. 56.

¹⁰⁹ Prusher, "Water Lies at the Heart of Mideast Land Fight," p. 2.

¹¹⁰ *Ibid.*, p. 57.

subsidized by the state, West Bank Palestinians receive no subsidy; moreover, they pay approximately six times more per cubic meter of water than do the settlers.¹¹²

Israel's heavy reliance on the waters of the West Bank is due not only to population growth, increasing urbanization and industrialization, but also due to the increasing amount of Israeli settlers in East Jerusalem (130,000), the West Bank (175,000), and the Gaza Strip (5,000). While Palestinian Arabs have been prevented from drilling new wells for agriculture, Israel's National Water Authority has drilled thirty-six wells on the West Bank and East Jerusalem between July 1969 and 1989 for the domestic and irrigation needs of Jewish settlers.¹¹³ And, unlike Arab wells, which don't exceed depths of 100 meters, those drilled by Mekorot are between 200 and 750 meters deep.¹¹⁴ While Arab withdrawals remain essentially fixed at 38mcm (average level in 1968), Jewish settlements have increasingly consumed water. In fact, Jewish settlers now consume approximately 83 percent of the total amount of water pumped on the West Bank.¹¹⁵ Settlement populations continue to increase and the present government shows no intention of slowing or halting the expansion. Furthermore, Israel's National Water Authority reports that based upon their projections for 2005, they plan to allot some 150 mcm for the West Bank Arab population, who will then number almost 1.3 million, and 110 mcm for the expected 210,000 Jewish settlers.¹¹⁶ These figures represent a ten times greater per capita water allocation for Jewish settlers than for West Bank Palestinians.

As for the Golan Heights, occupation has afforded Israel control over the upper Jordan River, water from which Israel acquires 18 percent or 30 mcm of its annual water

¹¹² House Committee on Foreign Affairs: Subcommittee on Europe and the Middle East, *The Middle East in the 1990s: Middle East Water Issues* (Washington, D.C., 26 June 1990).

¹¹³ Paul Quiring, "Israeli Settlements and Palestinian Rights, Part 2," *Middle East International* (October 1987), pp. 14-15.

¹¹⁴ John Kolars, "The Course of Water," p. 69.

¹¹⁵ *Ibid.*, p. 66.

¹¹⁶ Lonergan, Stephan and Brooks, David B., *Watershed: The Role of Fresh Water in the Israeli-Palestinian Conflict* (Ottawa, Canada: International Development Research Center, 1994), p. 36.

supply.¹¹⁷ More importantly, control of the Golan Heights has enabled Israel to block any Arab attempt to divert the Jordan River (comprised of the Dan River, Banias River, Hasbani River, and the Yarmouk River) from which Israel acquires nearly one-third of its annual water requirements. In fact, since 1953 Israel has been diverting waters of the Jordan River. In July of 1953, Israel started diverting the Jordan at Jisr Banat Yaquub, which was located in a DMZ, because it had a lower salinity level than points farther down the Jordan River fork and the drop in elevation between the site and Lake Tiberius was sufficient to enable the use of gravity, which was and still is cheaper than pumping such huge quantities of water.¹¹⁸

Syria protested and fighting ensued in the DMZ. This caused the United States to get more involved. The US sent envoy Eric Johnston to mediate a comprehensive allocation formula for the Jordan River basin. In the end, Israel proposed a seven year plan which the Syrians, including the Palestinian Arabs, rejected. They united and countered with an Arab Plan. The result was a Unified Plan, as proposed by envoy Johnston, which was accepted by technical committees of Israel, Lebanon, and Jordan. However, Syria vetoed it. The failure to develop a multilateral approach and share water caused Israel and Jordan to proceed with individual water projects, the National Water Carrier and the East Ghor Canal (a.k.a. Greater Yarmouk Project). From 1964, when the Arab League decided to try to stop the completion of Israel's National Water Carrier and protested Israeli sovereignty over the source of the Dan River, through 1969-70 when the PLO attacked Israeli water installations in the Jordan River valley, to today with the PLO/PA clamoring for an equal share of the water it asserts is has a legal right to, the Arabs have placed particular emphasis on Israel's over-consumption of water; withdrawal

¹¹⁷ 305 mcm represents 91 percent of the total potential yield of 330 mcm that is available in the Golan Heights.

¹¹⁸ Murakami, *Managing Water for Peace*, p. 226.

the Arabs say simply enhances Israel's capability to absorb more Jewish immigrants and enables Israel to continue to build settlements to the detriment of Palestinian refugees.¹¹⁹

Given that groundwater represents approximately 60 percent of the total water consumption of the State of Israel, and that about 40 percent of this source originates on the West Bank, the significance of the territory's water resources is indisputable. Without access to the groundwater supplies of the West Bank, Israel would be denied approximately one-quarter of the water it consumes. The combination of Israel's acute dependence on West Bank water supplies and the Palestinians' argument that they have a historical right to the land, and thus its resources, will continue to provoke competition and possibly armed conflict.

This combination of factors exposes one of the major reasons why Israel won't acquiesce and rescind control of the occupied territories. Israel considers continued access to these waters, which will undoubtedly be required to meet accelerating rates of population, urban, and industrial growth, a national security issue. Because of the perceived link between the water resources of the West Bank and the survival of Israel, accepting an independent Palestinian State on the West Bank, and therefore relinquishing control of the territory's resources, is interpreted by Israel's leaders as an act equivalent to "national suicide." Consider the following statement made by Meir Ben-Meir, Israel's Water Commissioner, in 1993:

Though it is the security imperative for Israel's retaining control of these areas (Judea and Samaria) that is usually discussed, the retention of control of their water resources is no less vital to its continued existence. Only unified, controlled management of the water resources the entire area west of the Jordan River can prevent water seeping in and causing irreparable damage. Israel's control of these areas is not negotiable. For if the Arabs were free to tap the aquifers to their hearts' desire, they could turn Israel's coastal plain into a desert.¹²⁰

¹¹⁹ Hillel, *Rivers of Eden*, pp. 149-157.

¹²⁰ Lowi, *Water and Power*, p. 191.

control of the territory's resources, is interpreted by Israel's leaders as an act equivalent to "national suicide." Consider the following statement made by Meir Ben-Meir, Israel's Water Commissioner, in 1993:

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Israel's Ministry of the Environment expressed this same sentiment in 1994 in its report titled, "The Environment in Israel,":

Because of the deterioration in both quantity and quality of the water in the coastal aquifer, the Yaqon-Taninim aquifer is the main supplier of drinking water in Israel...Over-exploitation is our main concern. Since the replenishment region of the aquifer is found in the administered [occupied] territories, future agreements between Israel and the Palestinians on use of the shared aquifer must include stringent requirements with regard to Palestinian use.¹²¹

The Likud Party, during elections in May of 1996 added that, "Judea and Samaria boast 40 percent of Israel's available fresh water supply. Water is our life. As such, it makes no sense to place it in the hands of those whose intentions towards us may not always be the kindest."¹²²

¹²⁰ Lowi, *Water and Power*, p. 191.

¹²¹ Gabbay, *The Environment in Israel*, p. 27.

¹²² Rouyer, "The Water Issue in the Palestinian-Israeli Peace Process," p. 68.

And today, the sentiment has not changed. Binyamin Netanyahu, leader of the Likud Party and presently Israel's prime minister, has no intention of giving Palestinians control over the West Bank, thereby ceding the aquifers to the Arabs:

In the Middle East, for the last 5,000 years, most of the wars have been fought over water and consequently territory. We are focused constantly on territory. But what good is it to resolve the issue of land, if you leave the issue of water unresolved. I intend to put Israeli security – including that of water supply – first. Water resources must stay under Israeli control.¹²³

He refuses to address the question of Palestinian rights to water in the West Bank.¹²⁴ When PLO negotiators do introduce them, Israeli negotiators are adamant in maintaining that the western basin – its main source of drinking water – and the northeast basin of the aquifer are non-negotiable.¹²⁵ Their position is grounded in international law and, as already mentioned, concerns over national security. With regards to international law, Israel bases its claim to the waters of the western and northeast basins of the West Bank aquifer on the international legal principal of prior use. In short, they assert they have a legitimate historical right to these waters because they were the first to develop and exploit them for agricultural use and economic development. They suggest that the same

¹²³ Prusher, "Water Lies at the Heart of the Mideast Land Fight," p. 1.

¹²⁴ Rouyer, "The Water Issue in the Palestinian-Israeli Peace Process," p. 67.

¹²⁵ Of the three main aquifer groups, only one is located in Israel proper, beneath Israel's coastal plain. This is the second most abundant of the three groups. The remaining two aquifers mentioned here originate in occupied territory: the Yarqon-Taninim and the Nablus-Jenin basins. What is key here is that only 5 percent of the combined recharge area of these two water tables is actually located in Israel proper. See Naff, "The Jordan Basin: Political, Economic, and Institutional Issues" in *Country Experiences with Water Resources Management: Economic, Institutional, Technological and Environmental Issues*, p. 3.

principles of international customary law which protect Egypt's claim to most of the water of the River Nile applies equally to their claim to the West Bank's aquifers.¹²⁶

Because water is related to Israel's national security, Netanyahu is not disposed to regional cooperation with the Palestinians. He believes that water-sharing, rather than being the path to peace or an indicator of trust, will create future conflict.¹²⁷ Indeed, it does not appear that Israel is going to mollify its position any time soon – authority over water policy and the negotiation of water issues with the PA has recently been transferred to the new Infrastructure Ministry of Ariel Sharon, hero of the 1973 Yom Kippur War, Israel's leading hawk, and one of the most outspoken right-wing voices in the Likud Party.¹²⁸ Judging from Sharon's past confrontations with the Palestinians, it is evident that Israel will be far less accommodating if not downright combative.

Arguably, with concurrent increasing population, urban, and industrial growth in Syria, Jordan, and in the West Bank in the next century, the final status issues concerning refugees, settlements, and land for peace (i.e., Palestinian sovereignty and the creation of a Palestinian state) may take a "back seat" to disagreements over water. Ultimately, the conflict will be less about land for peace and more about water for peace. In the words of a former Israeli water commissioner, "the water issue is a time bomb that will eventually demolish any political arrangements with regard to the future status of the Occupied Territories, unless they include a solution that is satisfactory to each side. One that

¹²⁶ Naff, "The Jordan Basin: Political, Economic, and Institutional Issues" in *Country Experiences with Water Resources Management: Economic, Institutional, Technological and Environmental Issues*, p. 3.

¹²⁷ Rouyer, "The Water Issue in the Palestinian-Israeli Peace Process," p. 67.

¹²⁸ Bickerton and Klausner, *A Concise History of the Arab-Israeli Conflict*, 3rd ed., p. 301.

addresses equitable allocation amounts, and access to and control over water resources.”¹²⁹

¹²⁹ Selig Taubenblatt, “The Jordan River Basin Water Dilemma: a Challenge for the 1990s,” in Joyce Starr and Daniel Stoll, eds., *The Politics of Scarcity: Water in the Middle East* (Boulder: Westview Press, 1988), p. 11.,” *Survival* Vol. 39, No. 2 (Summer 1997), p. 67.

V. PALESTINE'S PREDICAMENT

Demand is exceeding supply in the West Bank and Gaza Strip. Water scarcity is on the rise and is expected to accelerate through the year 2020 (Tables 4-1 and 4-2). Israeli's withdrawal of water and the impact of population growth are the primary factors pressuring total annual renewable water supplies in these territories; there is little urbanization and industrialization to speak of.¹³⁰ When Israel took control of the West Bank in 1967, it also took control of the recharge area for the Yaqon-Taninim (or Western Basin), Nablus-Jenin (or Northern basin), and Eastern (vicinity of Ramallah-Jericho) aquifers. Since then, Israel has been withdrawing approximately 560mcm per year or about 91 percent of the available water located in these aquifers (332mcm from the Yaqon-Taninim aquifer; 147mcm from the Northern aquifer; and 81mcm from the Eastern basin).¹³¹ The entire renewable recharge of the first two aquifers is already being exploited and the third is close to being depleted. Total consumption within the West Bank is 42mcm, mostly from wells designated by Israel for Israeli settlements (population 175,000); and 118mcm for approximately 1.2 million Palestinians. Each Israeli gets approximately 240 cubic meters per year, while the Palestinians are relegated to approximately 98 cubic meters per person per year.

¹³⁰ Two trends driving accelerating population growth are a high Palestinian birth-rate and Israeli immigration.

¹³¹ Biswas, Kolars, Murkami, Waterbury, Wolf, *Core and Periphery*, pp. 13-14 and p. 77.

Table 4-1. Projected Water Deficit, West Bank (mcm)

	<u>1990</u>	<u>2005</u>	<u>2020</u>
Water Demand ^a	807	820	850
Water Supply ^b	615	650-900	650-900
Net Annual Deficit ^c	192	170	200

^aIsrael is expected to curb its demand, not to supply Arabs with more water, but to avoid over-exploitation and resultant salt water intrusion.

^bFigures vary due to varying annual amounts of rainfall.

^cAssumes a modest immigration of 300,000 Arab refugees between 1995 and 2005; whereas, Table 4-3 assumes the extremes of zero immigration versus the influx of 600,000 immigrants between 1995-2005.

Source: compiled from Biswas, Kolars, Murakami, Waterbury, Wolf, *Core and Periphery*, pp. 13-14; Lowi, *Water and Power*, pp. 188-189.

Table 4-2. Projected Water Deficit, Gaza Strip (mcm)

	<u>1990</u>	<u>2005</u>	<u>2020</u>
Water Demand ^a	95	100-160	120-240
Water Supply	60	60	60
Net Annual Deficit ^b	35	40-100	60-180

^aAssumes no immigration. Demand varies based on natural population growth.

^bValues vary based on projected differences in water demand.

Source: compiled from Biswas, Kolars, Murakami, Waterbury, Wolf, *Core and Periphery*, pp. 13-14; Lowi, *Water and Power*, pp. 188-189.

As for population growth and the pressure it will exert on available water supplies, estimates based on 1994 data are insightful. According to the Middle East Water Commission, which for the West Bank assumes a low growth rate due to no immigration and a high rate that assumes the influx of 600,000 immigrants between 1995 and 2005, there will be an absolute water deficit of 215mcm in 2020 without immigration and 345mcm in 2020 if immigration were to take place (see Table 4-3).¹³² For the Gaza

¹³² Ibid., pp. 39-41.

Strip, where 900,000 Palestinians and 5,000 Israelis reside and present withdrawal already exceeds supply by 35 mcm per year, it is estimated, assuming no immigration, that there will be an absolute water deficit of 60-180mcm by 2020, and this assumes that the natural supplies of water there will remain clean enough to use (see Table 4-3).¹³³ The problem in Gaza is particularly acute because the difference between annual supply (60 mcm/yr.) and use (95 mcm/yr.) is made up by over-pumping which has resulted in salt-water intrusion into Gaza's coastal aquifer.¹³⁴

Table 4-3. Projected Population and Water Demand, West Bank (1994)

Entity	Population (millions)	Water Needs Low Demand (mcm/yr)	Water Needs High Demand (mcm/yr)	Low/High Water Deficit (mcm/yr)
<u>No Immigration:</u>				
2000	1.21	120	210	5/95
2020	3.67	170	460	25/215
<u>600,000 Immigrants:</u>				
2000	1.61	125	250	10/135
2020	3.67	170	460	55/345

Source: Biswas, Kolars, Murakami, Waterbury, Wolf, *Core and Periphery*, p. 40.

The Palestinians have been expressing their dissatisfaction with Israel's excessive water withdrawal from the West Bank since at least 1967. Little water is left for the resident population, and of what remains, 35.5 percent goes to support the expansion of

¹³³ Ibid., pp. 40 and 77.

¹³⁴ Ibid., pp. 77-78 and Berkoff, *A Strategy for Managing*, pp. 12-13.

Israeli settlements. Palestinian water usage and attempts at new water development have been severely limited by Israeli authorities. Israel has been adamantly against any increase in Palestinian water usage because any overdraft of the West Bank aquifers would result in salt-water intrusion along Israel's coastal plain and eventually into the mountain aquifers.¹³⁵ The Palestinian National Council, on the other hand, objects to Israeli control, claiming exclusive rights to all of the ground and surface water which originates in the West Bank. To the Palestinian Authority (PA), water rights are one component of their right to a state and the powers and privileges that possessing state sovereignty entails. Based on this reasoning, the PA lays claim to all but a minute portion of the mountain aquifer's water, all of the Gaza Strip's ground water, and to the portion of the Jordan Basin surface water that would have been assigned for use by the West Bank under the failed US-initiated negotiations in the 1950s.¹³⁶ The Palestinians believe that these water rights must be recognized by the Israelis before more advanced negotiations on sharing and developing new water sources can take place. According to Sa'eb Erekat, presently Minister of Local Government in the PA and chief Palestinian negotiator for the permanent-status talks, "water rights are what the negotiations are all about, but Palestinians do envision cooperation with the Israelis in the future on the use of resources once they recognize these rights."¹³⁷ Erekat and other Palestine Liberation Organization (PLO) officials and water negotiators point out that Palestinians have always had natural rights to the water beneath their land whether they were under

¹³⁵ See Gabbay, *The Environment in Israel*, p. 27. And also, Biswas, Kolars, Murakami, Waterbury, Wolf, *Core and Periphery*, p. 77.

¹³⁶ The negotiations referred to were arbitrated by American envoy Eric Johnston. They called for an equitable division of the waters of the Jordan River basin and the aquifers of the West Bank among Israel, Jordan, and Palestine. The plan suggested that the Palestinians take their water from the 770 mcm allocated to Jordan per year. The Johnston Plan, although vetoed by the Arab League at the time, was accepted by Israeli and Jordanian technical experts. The politicians, however, never assented – Israel still contends that the PA should look to Jordan for its 'fair share.' As a result, the Palestinians have not received, since 1953, their 'fair share' of 79-110 mcm per year.

¹³⁷ Prusher, *Water Lies at the Heart of the Mideast Land Fight*, p. 2. And also, Joel Peters, *Building Bridges: The Arab-Israeli Multilateral Talks* (London: The Royal Institute of International Affairs, 1994).

Ottoman, British or Jordanian rule/occupation. The PLO asserts that only under Israeli occupation have these rights been denied:

The Israelis have been stealing our water and it must stop. They must be reminded that they are sitting on our chests; and not by act of God, but by act of war...Our Israeli counterparts have been stalling on decisions because the rest of the peace process is frozen. There are few water-management issues that Israelis see as unrelated to them. Ben-Meir has said himself that they are not prepared to speak about water rights. He recognizes only need, not rights.¹³⁸

The basic Palestinian negotiating position has not been limited to the demand for water rights. Other major concerns include the need for independent access to Israeli data on: the water resources in the region; the extent/frequency of Israeli drilling in occupied Palestinian territory; and consumption rates, particularly of Jewish settlers. Israel possesses detailed and precise information on water resources in the region from decades of scientific assessments, including metering all wells in the West Bank since 1967. To date, this information has not been available to the public, much less the PA, because water is considered a national security concern. In fact, almost no data pertaining to water in Israel or the West Bank is available that has not been specifically released by official Israeli government sources. As a result, Palestinian water specialists and negotiators charge that the officially released figures are censored and therefore suspect. They contend that the Israelis have an interest in falsifying the data in order to support their case and continue with settlement expansion. Ryiad El-Koudary, chair of the Palestinian delegation to the multilateral water working group, commented that, "if

¹³⁸ Ibid., p. 22.

we are going to make progress, if we are going to discuss cooperation and sharing, we will have to know what they have and that what they say is accurate and truthful.”¹³⁹

Parallel to the request for water data, the PA has asked Israel to stop all drilling in the West Bank and the remaining occupied areas of the Gaza Strip until a final agreement on the allocation of water resources is achieved. Not only does the PA charge the Israelis with stealing Arab water, but they also assert that over-pumping by the Israelis on both sides of the Green Line threatens the long-term viability of the area’s water table. According to the PA, only the Arabs have the legal right to control ground water resources in the West Bank. As such, the Israelis should cease drilling and pumping and the Palestinians should be allowed to resume drilling immediately.

The Palestinians’ stated position has been that once agreement was reached on these aforementioned principles they would accept the concept of joint management and equitable utilization of the region’s water resources according to some as-yet-undetermined formula. At both the bilateral and multilateral talks the PA stated, “what we ask for is a water charter for the region that is accepted by all riparians in the region. If a peace agreement is to last, water resources must be shared in an equitable fashion, not unilaterally allocated or parsed out by Israel.”¹⁴⁰ While a number of water-sharing formulas have been proposed, none, so far, has been acceptable to both sides. The Palestinians have argued that if the waters of the mountain aquifer are to be shared, then so should those of the upper Jordan River. Jad Isaac, chair of the Palestinian delegation to the UN’s Working Group on Water Resources, succinctly expressed the PA’s position with respect to any formula: “If they [Israel] want to share what is mine, then they must

¹³⁹ Rouyer, “The Water Issue in the Palestinian-Israeli Peace Process,” p. 64.

¹⁴⁰ Peters, *Building Bridges*, p. 37.

share theirs as well.”¹⁴¹ Nor do the Palestinians find the current system of Israeli water management an acceptable one. They criticize Israel’s policies of state ownership of all water resources and heavy subsidization of water for agriculture, which they claim encourages waste.¹⁴² All of this is to say that if a joint water authority is to be established, the Palestinians will undoubtedly demand as a prerequisite modifications to present Israeli policies and practices.

Palestinians base their claim to water rights on the legal grounding of United Nations Security Council Resolution (UNSCR) 242 and the international law of belligerent occupation.¹⁴³ The PA’s argument is a complex one, but it can be summarized as follows. Essentially, the PA claims that water, like land, is an immovable property and cannot be confiscated or exploited without just compensation – which has not been forthcoming from the Israelis. UNSCR 242 affirms the principle of relinquishing territory acquired by war in return for lasting peace and has been accepted by both Israel and the PLO in the 1993 Declaration of Principles (DOP).¹⁴⁴ The PA argues that water is inseparable from land under which it flows and is therefore property. Implementing Resolution 242 requires the occupation to end and all land to be returned to the Palestinians. With sovereignty over the land comes sovereignty over what lies below it, according to Palestinian reasoning. According to the PA, “it is very simple, land and water go together as property rights.”¹⁴⁵

¹⁴¹ Ibid., p. 42.

¹⁴² Efraim Inbar, “Regional Security Regimes: Israel and Its Neighbors,” *Regional Security Issues* Vol. 32, No. 3, (1995), p. 242.

¹⁴³ Bickerton and Carla Klausner, *A Concise History of the Arab-Israeli Conflict*, 3rd ed., pp. 159-160.

¹⁴⁴ Ibid.

¹⁴⁵ Rouyer, “The Water Issue in the Palestinian-Israeli Peace Process,” p. 65.

The second pillar of the Palestinian property-right case rests on the argument that Israel has violated the international legal principles of belligerent occupation. These rules were codified in the 1907 Hague Regulations and the 1949 Geneva Conventions, both of which addressed the protection of individuals' rights during war or occupation. According to these conventions, the occupying power is required to act in a usufructuary capacity over the occupied country until such time as a peace treaty is signed, resolving the issues in dispute. As a result, the PA negotiators argue that Israel has clearly violated international law in exploiting the aquifers under the West Bank and Gaza Strip. The occupying power, as a usufruct and by definition, may not alter the existing legal system, administrative structure, or exploit the natural resources/property beyond its normal use.¹⁴⁶ One principle that governs exploitation by the occupying power is the distinction between movable and immovable property. Movable resources – especially those with a military application – such as equipment and transport systems, may be legitimately confiscated for the occupying power's use, but compensation must be paid. Immovable property, however, carries a much greater restriction on its use. These immovable items, such as a government building or natural resources, may be used but not confiscated. According to the Palestinian argument, the question then becomes whether the West Bank aquifers are movable or immovable property.

The PA asserts that ground water can only be legally classified as an immovable resource. They cite precedents and international opinion which generally hold subterranean oil resources to be immovable property. In particular, they refer to the case

¹⁴⁶ Usufruct is generally defined as the right of using and enjoying the fruits or profits of the property of others without altering or doing detriment to the substance of the property. It allows the right to benefit from property but not the right to damage or destroy it. See L. Goldie, "Title and Use (and Usufruct) – An Ancient Distinction Too Often Forgotten," *American Journal of International Law* Vol. 79 (July 1985), pp. 689-714.

of Israel's exploitation of untapped oil fields in the Gulf of Suez of the Sinai Peninsula while it occupied the territory from 1967-79. While Israel denied that it had violated that Hague Regulations on Belligerent Occupation, the United States believed that the oil was immovable property and Israel's action violated generally accepted principles regarding usufruct.¹⁴⁷ In fact, it was generally agreed at the time that oil was immovable and therefore compensation was required. The PA argues that underground water must be treated in the same way. They hasten to add that although the Israelis correctly argue that the aquifers are renewable and oil resources are basically non-renewable, Israeli over-exploitation of ground water resources will result in permanent damage.¹⁴⁸

Based upon this reasoning, Palestinian lawyers argue that Israel's water policy in the Occupied Territories violates international law. Military orders went far beyond the limits of usufructuary obligations not to cause harm to the occupied territory.¹⁴⁹ The PA asserts that Israel used the occupation of Palestinian territory, "to confiscate, divert, and utilize the existing water resources not for the benefit of the resident population, or for its military use, but to pump the water to Israel itself and to provide for its civilian settlers."¹⁵⁰ Moreover, the lack of compensation paid in acquiring these resources, according to the PA, constitutes the abnormal use of immovable property. Considering the Palestinians' position and Israel's intransigence, the prospects for cooperation are indeed dim.

¹⁴⁷ Brice Clagett and Thomas Johnson, "May Israel as a Belligerent Occupant Lawfully Exploit Previously Unexploited Resources on the Gulf of Suez?," *American Journal of International Law* Vol. 79 (July 1978), pp. 559-585.

¹⁴⁸ Biswas, Kolars, Murakami, Waterbury, Wolf, *Core and Periphery*, pp. 77-78.

¹⁴⁹ Military orders 158 and 291 transferred all water resources of the four West Bank aquifers to Israeli control; required the metering of all existing wells; and required the granting of permits for drilling wells and for improving wells and other water works. See Murakami, *Managing Water for Peace*, p. 209.

¹⁵⁰ Rouyer, "The Water Issue in the Palestinian-Israeli Peace Process," p. 66.

VI. IMPLICATIONS FOR U.S. FOREIGN POLICY

In 1991, Joyce Starr, a specialist on the Middle East and water security issues, warned that competition over dwindling supplies of water resources in the Middle East would lead to war:

The Middle East water crisis is a strategic orphan that no country or international body seems ready to adopt. Despite irrefutable evidence that the region is approaching dangerous water shortages and contamination, Western leaders have so far failed to treat the issue as a strategic priority... When the current Persian Gulf War ends, the water crisis could erupt. This water security issue... could eventually become a catalyst for armed conflict in the Middle East. Water security will soon rank with military security in the war rooms of [Western] defense ministries.¹⁵¹

In 1997, Starr's assessment of the oncoming crisis and recommendation that water scarcity become a strategic priority for the world's leaders, was finally acknowledged by the United States.

Up until 1997, the linkages between resource scarcity and dependence and national security concerns attracted little interest in the National Security Agency (NSA), Department of State (DOS), Department of Defense (DOD), National Intelligence Council (NIC), and National Security Council (NSC).¹⁵² Slowly, however, these

¹⁵¹ Joyce Starr, "Water Wars," *Foreign Affairs*, No. 82 (Spring 1991), pp. 17-36.

¹⁵² The focus of recent academic international security analysis has been "geopolitics" or "realpolitik," which stresses the concept of power politics as the root of conflict. Even at this level the analysis, the role of resources as a goal of military action is acknowledged, particularly if the resources are a defining factor in the power of a nation. The drive to possess or control another country's oil has often been a goal of military action, including Japanese actions of WWII, the conflict over the Falkland Islands, and the Persian Gulf War in 1990/91. Although non-renewable resource such as oil and other mineral are more typically the focus, water can fit into this framework if water provides a source of economic or political strength. Under these conditions, ensuring access to water provides justification for going to war, and water supply systems can become a goal of military conquest. See Ronne D. Lipschutz, *When Nations Clash: Raw Materials, Ideology, and Foreign Policy* (New York: Ballinger Publishing Co., 1989). And also, Malin Falkenmark, "Fresh Water as a Factor in Strategic Policy and Action," in Arthur H. Westing, ed., *Global*

departments and agencies recognized that the environmental degradation of renewable resources, such as water located in the Middle East, was a potential source of conflict; more specifically, that environmental stresses amplified by political conflict and caused by rapid population growth, over-exploitation, external climatic phenomena (e.g., droughts), accelerating industrialization-urbanization, pollution, and the irresponsible mis-management/monopolization of scarce resources, were going to act as destabilizers in various regions around the world, continually provoking competition and conflict. In 1993, the Central Intelligence Agency (CIA) published a risk assessment paper concerning resource scarcity and the threat it posed to the stability of the international security environment.

Later, the U.S. administration came around and established high level positions dealing with the environment. In November of 1997, positions were created at the NSC, NIC, the DOD, and the DOS. "Outposts of natural diplomacy" were assembled to monitor the depletion of the world's natural resources and, more importantly, to monitor countries that pose an environmental threat to our friends and allies. Their charter: to predict when and where such conflicts might arise.

Not all water resources disputes, however, will lead to violent conflict. Indeed most lead to negotiations, discussions, and non-violent resolutions.¹⁵³ But in certain regions of the world, such as the Middle East, southern and central Asia, and southern Africa, water is a scarce resource that has become increasingly important for economic

Resources and International Conflict: Environmental Factors in Strategic Policy and Action (Oxford: Oxford University Press, 1986), pp. 85-113.

¹⁵³ Examples include: a treaty signed between India and Bangladesh in December 1996 that peacefully resolved a disagreement concerning allocation of Ganges River water; and a basin-wide management scheme agreed upon in February 1997 by both Egypt and Ethiopia concerning Nile River water. See Sandra Postel, *Last Oasis: Facing Water Scarcity* (New York: W.W. Norton & Company, 1997).

and agricultural development.¹⁵⁴ In these regions, water is evolving into an issue of "high politics," and it is this thesis's assertion that the probability of conflict, arising over, or exacerbated by, water issues is increasing. Consequently, U.S. policymakers and the military should be alert to the likelihood of armed conflict in the Middle East over water, and begin now with a more assertive foreign policy focused on: (1) establishing a unitary basin-wide management scheme, developed by all parties involved; (2) enforcing international law; (3) continued finance of water purification and desalination research and development; (4) consideration of bringing political pressure to bear on those parties, such as Israel – however politically unpalatable, that refuse to cooperate; and (5) deliberate and crisis action planning designed to handle, if need be, the defense of allied or neutral country dams, canals, water import vehicles/routes, and water development projects.¹⁵⁵

Establishing a unitary basin-wide management scheme would involve a three-stage process.¹⁵⁶ First, the parties must agree to form an independent, international panel

¹⁵⁴ In the Middle East, significant water-ways include the already mentioned Jordan River basin, and the Tigris-Euphrates basin, where Turkey's control of the headwaters of both rivers, via the development of the Grand Anatolia Project (GAP)/Ataturk Dam, has raised Syrian and Iraqi anxieties over the availability of water for their own agricultural and industrial projects. When drought has depressed Turkey's economy, like in 1989, Turkey holds back the flow of the Euphrates, which has infuriated Syria. See Starr, "Water Wars," pp. 28-31. In southern Asia, two southern Indian states, Karnataka and Tamil Nadu have exchanged gun fire over the water of the Cauvery River. See Danielle Knight, "Water Looms as Major Source of Conflict Next Century," *Inter Press Service*, 11 March 1997. In southern Africa, Namibia and Botswana have exchanged gun fire over water from the Okavango River essential for urbanization and tourism in each country. See Knight, "Water Looms as Major Source of Conflict," p. 2.

¹⁵⁵ Deliberate and crisis action plans are "blueprints," drafted by the Joint Chiefs of Staff and U.S. Unified Commanders, that dictate the course or courses of action to be taken in the event that the use of military force is required. Deliberate plans are drafted over a 18-24 month period and typically direct the planning necessary to handle, for example, major regional contingencies, while crisis action plans are drawn up to handle problems that arise on short notice, and they usually are produced within hours or days. See John M. Shalikashvili, *User's Guide for Joint Operation Planning*, 11 September 1994.

¹⁵⁶ Miriam Lowi, interview by author, 12 May 1998. Lowi proposes a three stage process, this thesis adds a fourth – namely, treating water as an economic unit, or commodity. This practice would include the elimination of water subsidies, which would then allow the price of water to naturally rise, through market forces, to its actual economic value. Prices which actually reflect water's economic, or scarcity value, give information to users, which they could use to make choices regarding water consumption and use. In

of experts, and abide by the results of its studies. The panel's task would be to determine exactly the amount of water available for use from West Bank sources; locations and directions of flow; the extent and nature of water demand in Palestinian and Israeli areas, including settlements; the condition of the area's water wells; and the accuracy of water meters currently installed. To date, the information is kept secret by Israel's Ministry of the Environment.

The second stage would involve deciding on water allocations from each aquifer based on the results of the studies conducted in the first stage of the process. Once the panel fixed the allocations, the West Bank population would have the right to pump to the extent of its quota from the specified aquifers, while leaving the remainder to flow freely across the border.

In the third stage, the international panel would establish a monitoring system to oversee allocations. This would include meters to gauge extractions, and international inspectors at extraction sites to supervise and, more importantly, scrutinize allocations. In addition, the multilateral panel would establish mechanisms for arbitration and the imposition of sanctions. Financial disincentives would be emphasized.

The fourth component of an effective unitary basin-wide management scheme would include the adoption of the practice of treating water as an economic good, or unit. By eliminating subsidies, the price of water would naturally rise, through market forces, to its actual economic value, and consequently, encourage, if not coerce, better conservation efforts.

general, water pricing is an important way of improving water allocation and encouraging users to conserve scarce resources.

No unitary basin-wide management project will be effective, however, unless the laws established to ensure compliance as mentioned above, and those already in existence, are more aggressively enforced. International water law is difficult to enforce, however, because of the many intricacies of interstate politics, national practices, and other complicating political, ethnic, and social factors. In general, for nations sharing river basins, factors affecting the successful negotiation, implementation, and enforcement of international agreements and laws include: whether a nation is upstream, downstream, midstream, or sharing a river border; the relative military and economic strength of the nation; and the availability of other sources of supply. Despite these complicating factors, there is room for improvement, for more assertively holding those states that violate international water law accountable for over-exploitation, pollution, and violations of "equitable utilization."¹⁵⁷

The principle of equitable utilization has been challenged by states like Israel, who invoke the so-called "Harmon Doctrine," which holds that a nation can use the water within its borders without restriction even if that use substantially injures a neighbor.¹⁵⁸ This invocation is in contravention to historical practice, however. Almost all the river treaties signed in the last 100 years reject this practice and restrict the freedom of action of upstream nations. Upstream and midstream riparians, and those that share

¹⁵⁷ In 1991, the International Law Commission of the U.N. completed the provisional adoption of thirty-two articles on the Law of the Non-Navigational Uses of International Watercourses. Among the general principles set forth was that of equitable utilization, that is, the obligation not to cause harm to other riparian states. The principle means that each basin state, including internationally recognized territories, is entitled to a reasonable and equitable share in the beneficial use of shared water. See Peter H. Gleick, "Water and Conflict: Fresh Water Resources and International Security," *International Security* Vol. 18, No. 1 (Summer 1993), p. 106.

¹⁵⁸ Steven McCaffrey, "Water, Politics, and International Law," in Gleick, ed., *Water in Crisis* (New York: Oxford University Press, 1993).

surface/ground water supplies have an obligation under international law to not only equitably distribute supplies, but also not harm each other's water resources.

To enforce international law, political pressure must be brought to bear on those states that refuse to cooperate. In addition, financial penalties, handed out under U.N. auspices, through the International Monetary Fund and the World Bank, would work as a disincentive to over-exploitation, pollution, and violations of "equitable utilization."

In the event that the above prescription for reducing water-related conflict does not succeed, the United States, as the world's only superpower with the "responsibility to lead and prevent international instability,"¹⁵⁹ must be prepared to intervene militarily to handle water-related crises in the Middle East. This means being prepared to defend allied or neutral country dams, canals, water import vehicles/routes, and water development projects. Presently, deliberate or crisis action plans formulated to handle such a contingency do not exist.¹⁶⁰ In order for the U.S. military to "underwrite the policies of the President's *National Security Strategy*,"¹⁶¹ this thesis recommends collaboration between the "outposts of natural diplomacy" and Department of Defense planners now so that the United States is prepared for water-related conflict.

In short, the prescription for the prevention or resolution of riparian disputes should be a strategy that incorporates diplomatic, financial, and military tools.

¹⁵⁹ William J. Clinton, *A National Security Strategy for a New Century* (Washington, D.C.: U.S. Government Printing Office, 1997).

¹⁶⁰ Peter H. Daly, Captain, United States Navy, Plans, Policy, and Resources Office of the Joint Chiefs of Staff (J8), interview by author, 24 May 1998.

¹⁶¹ John M. Shalikashvili, *National Military Strategy: Shape, Respond, Prepare Now – A Military Strategy for a Era* (Washington, D.C. U.S. Government Printing Office, 1997).

VII. CONCLUSION

A. THE ARAB-ISRAELI CONFLICT

International water managers and engineers, the Working Group on Water Resources, the Middle East Water Commission, the World Bank, and technicians of both Israel and the Palestinian National Council (PNC) have acknowledged that any future unilateral development is likely to be extremely expensive and politically volatile because the solutions offered thus far are prohibitively expensive for any one country to finance and such a course of action will undoubtedly threaten the resources of another country. Cooperation, for these scientists, is the minimum prerequisite if the Israelis and Palestinians expect to meet the increasing demand on available water supplies.

Consequently, there have been many attempts at cooperation and, when necessary, conflict management. Those discussed in Chapters III, IV, and V failed. Others, like those arbitrated by the U.N., European Union (EU), and the United States in six multilateral negotiation rounds held from January 1992 to April 1994, were similarly designed to resolve the intractable problems of determining what constitutes reasonable and equitable sharing of water and what functions and powers should be granted to a joint water authority, but like the bilateral talks these too failed.¹⁶² The reason for lack of success (or progress) was because there was no political agreement; that is, a political mechanism, characterized by a combination of political, economic and technical measures plus political accommodation, by which both sides could sort out exactly how

¹⁶² See Peters, *Building Bridges*, pp. 19-23. And also, Biswas, Kolars, Murakami, Waterbury, Wolf, *Core and Periphery*, chp. 4.

to cooperate in managing the water resources of the Jordan River basin.¹⁶³ Given the lack of success of the aforementioned bilateral talks and the inability of multilateral negotiations to resolve the dispute over water, the outlook for peace is unfavorable. Also obstructing the road leading to cooperation are the following factors: (1) neither side is listening to their own scientists and scholars who have offered viable, apolitical, and relatively fair water-sharing formulas, including a proposed four stage process for developing a joint water management system;¹⁶⁴ (2) Zionist ideology still associates water with the founding myths of the state;¹⁶⁵ and (3) no agreement can be reached with respect to the definitions of sovereign versus historic/natural water rights, the very departure point from which any cooperation must logically begin.

If a final settlement agreement is reached, then at least as far as water is concerned, it will not be "just," or "lasting." As a matter of fact, should an agreement be reached with respect to the status of refugees, Jewish settlements, Jerusalem, and the recognition of Palestinian sovereignty in the form Palestinian statehood, despite the best efforts of both sides, water scarcity may re-ignite the conflict. In the case of continued conflict, water related issues will only serve to exacerbate political tensions and 'fuel the fire'. Why the pessimism? First, this is a zero-sum game. Water is essentially a fixed quantity in the Levant region. As such it is a vital commodity - water for one country means less for another. Second, Israel and the PLO are up against the numbers; that is,

¹⁶³ Jad Isaac and Jan Shelby, "The Palestinian Water Crisis: Status, Projections and Potential for Resolution," *Natural Resources Forum* Vol. 20, No. 1, 1996, pp. 25-26.

¹⁶⁴ For a detailed discussion of the proposed water-sharing formulas and the structure and function of the proposed joint water authority see Hillel Shuval, *A Proposal for the Development of a Regional Water Master Plan* (Jerusalem: Israel-Palestine Center for Research and Information, 1993).

¹⁶⁵ Alwyn R. Rouyer, "Zionism and Water: Influences on Israel's Future Water Policy During the Pre-State Period," *Arab Studies Quarterly* Vol. 18, No. 4 (Fall 1996). For a more thorough treatment of the relationship between culture and water in the Middle East see Rosina Hassoun, "Water Between Arabs and

accelerating rates of population growth, urbanization, and industrialization. These demographics will increasingly pressure finite water resources, and therefore, make securing what water remains an absolute necessity. To slow or halt these trends, a number of solutions have been proposed. However, treated wastewater projects, although cheap, have been too inefficient to justify additional funding.¹⁶⁶ As for water imports, various alternatives have been suggested. They include the following:¹⁶⁷

- A "peace pipeline" project for delivering water from surplus river basins, namely the Seyhan and Ceyhan river systems in southeast Turkey, to Israel, the West Bank, Jordan, Egypt, southern Syria, and Saudi Arabia; and
- The importation of water by tug or tanker, or more exotically – in icebergs towed from arctic regions.

Each of these alternatives, however, carries with it high costs. Furthermore, in the case of the peace pipeline and tanker alternatives, the recipient country is dependent on another state for water: Israel would acquire water from Turkey, and the Arabs would

Israelis: Researching Twice-Promised Resources" in John Donahue and Barbara Johnson, eds., *Water, Culture, & Power: Local Struggles in a Global Context* (Washington, D.C.: Island Press, 1998), chp. 15.

¹⁶⁶ The potential for the use of treated wastewater in irrigation was reviewed in detail in a World Bank report (1993). The report concluded that wastewater reuse can both add to water supply and have important environmental benefits provided use is carefully controlled. Total wastewater flows are rising rapidly due to increasing urbanization, and although in most countries they will remain small relative to total renewable resources, in water-short countries and territories like Israel, the West Bank, and Jordan, they may represent the predominant long-term water supply for irrigated agriculture. The costs of wastewater treatment are US\$ 0.12-0.40 per cubic meter, which compares favorably not only with desalination but also with the more expensive proposed interbasin transfer schemes. However, due to the inefficiency of current systems, the fear is that the savings generated may be largely offset by required costs necessary to ensure health and environmental standards are met. There is a strong desire to safeguard other sources of supply. See Berkoff, *A Strategy for Managing Water*, pp. 28-30. And also, Dinar and Subramanian, *Water Pricing Experiences*, p. 64.

wait to get their fair share from Israel, where the water would first be delivered.¹⁶⁸ Israel is adamantly unwilling to expose itself to the risks that these options imply. The Palestinians believe that by cooperating, they implicitly admit reliance on Jewish charity/assistance. More significantly, it would mean that the Palestinians accept the status quo regarding Israeli use of the West Bank's water resources.¹⁶⁹ Nevertheless, as conventional supplies are completely exploited [recall: Israel, Jordan, and the Palestinians already currently use between 98.9 percent (Israel) and more than 100 percent (Jordan and the West Bank of their annual renewable fresh water supply)] the alternatives may become affordable in the longer term, if not an absolute necessity.

Preliminary estimates of the costs of the peace pipeline are US\$ 0.8-1.07 per cubic meter, which could make deliveries competitive with desalinated supplies. However, financing problems are formidable, and construction would take a decade or more.¹⁷⁰ Additionally, this project would cut across several states. Such a transfer project, built across national boundaries, may prove insurmountable given the fact that Israel, Jordan, Syria, Saudi Arabia, and Egypt have expressed reservations about relying on water controlled by another state. As for the import of water by sea, it is estimated at US\$ 0.22 per cubic meter for water transported by tugs dragging synthetic rubber bladders.¹⁷¹ This method, however, has not been proven technically feasible. The cost

¹⁶⁷ Berkoff, *A Strategy for Managing Water*, p. 29.

¹⁶⁸ Biswas, Kolars, Murakami, Waterbury, Wolf, *Core and Periphery*, p. 136.

¹⁶⁹ Ibid.

¹⁷⁰ Total project cost has been estimated at US\$ 21B, which would make it one of the most expensive transboundary projects in the world (compare the Euro tunnel, at US\$ 15B; the Itaipu (Brazil/Paraguay) dam, at US\$ 9B; and the Mediterranean-Dead Sea canal project, at US\$ 2B). The pipeline's total length would be 6,550 km. See Murakami, *Managing Water for Peace*, p. 45.

¹⁷¹ Water from the Manavgat River on the south central coast of Turkey, which now flows unused into the Mediterranean Sea, would be taken by pipeline to an offshore loading facility. Thereafter, it would be loaded into "Medusa bags" or "Aquarius linked bags" for delivery to Israel and the Gaza Strip. See Biswas, Kolars, Murakami, Waterbury, Wolf, *Core and Periphery*, p. 136.

of shipping water by conventional tankers is estimated at more than US\$ 1.0 per cubic meter.¹⁷²

Another proposal includes the desalination of natural brackish water reservoirs in the region followed by a phased-in transition to the desalination of sea-water (costs are directly related to the salinity of the raw water used to produce fresh water; therefore brackish water sources are planned for exploitation first). Various projects have been proposed for sea water desalination, including canals or pipelines from the Red Sea or the Mediterranean to the Dead Sea.¹⁷³ They present both environmental and economic questions, however. The highly saline residue of the desalination process discharged into the Dead Sea could aggravate the salinity level of the Jordan valley aquifers. On the economic level, the cost of either project would be prohibitive. Estimates of the cost of construction have been put at US\$ 3B, which does not include piping desalinated water to consumers.¹⁷⁴

In short, Israel and the Palestinians will need additional fresh water no later than 2015.¹⁷⁵ The intervening period is relatively short given that it typically takes from five to ten years or more to plan, design, finance, build, and start up major water development projects.¹⁷⁶ Conventional sources are being consumed at an accelerating rate, in some cases already in excess of what is presently available. Nonconventional sources, such as treated wastewater, water imports, and sea water/brackish water desalination projects, are either too expensive or politically unpalatable to both sides. As water shortages

¹⁷² Berkoff, *A Strategy for Managing Water*, p. 29.

¹⁷³ Murakami, *Managing Water for Peace*, pp. 289-292.

¹⁷⁴ For a detailed discussion of the drawbacks associated with sea water desalination see Rouyer, "The Water Issue in the Palestinian Peace Process," p. 76. And also, Gabbay, *The Environment in Israel*, p. 21.

¹⁷⁵ Rouyer, "The Water Issue in the Palestinian Peace Process," p. 76.

¹⁷⁶ Berkoff, *A Strategy for Managing Water*, p. 26.

occur and full utilization is reached, it would seem to be unavoidable that the severity of the Jordan valley water problem will continue to increase significantly. In an already overheated atmosphere of political hostility, the lack of sufficient water to satisfy even basic human needs may cause conflict, perhaps even armed conflict.

The third phenomenon that will “fuel the fire” of hostility and thus preclude cooperation will be Palestinian sovereignty. If, in fact, Palestinians are granted their own state, which they intend to declare in any case come May 4th, 1999,¹⁷⁷ pressure is sure to build from the international community, perhaps lead by the United States, on the Israelis to relinquish its control over water as this new Arab state flexes its right over water located in its sovereign territory. Incidentally, state sovereignty and the belief that water rights are one component of the powers and privileges that possessing statehood entails is one of the same arguments Israel uses to justify its diversion of the Jordan and Yarmouk River headwaters and use of West Bank aquifers.

As for the fourth factor that may serve to impede cooperation, recall Israel’s position that it cannot relinquish any portion of the water it already uses.¹⁷⁸ Binyamin Netanyahu considers continued access to the waters of the West Bank and Golan Heights, which will undoubtedly be required to meet accelerating rates of population, urban, and industrial growth, a national security issue. Recent comments by the prime minister reflect his preoccupation with security, how the resources of the occupied territory are tantamount to the very existence of the State of Israel, and reservations concerning a Palestinian state:

¹⁷⁷ Statement made by Ms. Hanan Ashrawi, spokeswoman for the Palestinian delegation to the Middle East peace talks and member of the Palestinian National Council, on 5 May 1998; C-SPAN coverage of American Press Club, *Arab-Israeli Peace Negotiations* (Washington, D.C.: American Press Club, 5 May 1998).

Israel is a small democracy in a hostile neighborhood. We have two concerns – compliance and security, the most important of which is Israel's security. We need it. Handing over territory, whether it be the 13.1 percent the Palestinians want or the 9 percent we are willing to entertain, would represent roughly one-eighth of the land that is Israel.¹⁷⁹ For such a small country, this is not a small concession... We cannot defend ourselves by handing over territory that holds troops, roads, infrastructure, and water resources.¹⁸⁰

Allowing a Palestinian state, for all we know, may mean another Iran or Iraq next door. This is not acceptable. To ensure a peaceful coexistence, Israel intends to limit their [Palestinian's] power to govern their own state.¹⁸¹

The point is, don't expect Israel to relinquish control of necessary water resources without a fight.

Perhaps no phenomenon will be more influential on the potential for cooperation than the inter-relationship between water, territory, and security. As previously mentioned, Israel considers access to the region's water essential for its security. To the PLO, enough water to meet increasing demand concerns mere survival. Efforts have been made to reach a cooperative, basin-wide arrangement for the utilization of the waters of the Jordan River system so that each party is allotted its necessary share. However, in none of the cases has the result been an optimal pattern of river basin development – via unitary, basin-wide planning and management which prevents one state from unilaterally exploiting available water resources.

¹⁷⁸ Biswas, Kolars, Murakami, Waterbury, Wolf, *Core and Periphery*, p. 77.

¹⁷⁹ 1 percent of occupied territory is equivalent to 55km³, roughly that land which defines Tel Aviv proper.

¹⁸⁰ "Arafat and Netanyahu Address the State of Middle East Peace Talks," CNN's *World Report*, 7 May 1998.

¹⁸¹ Ibid.

What has been serving as a disincentive to cooperation, and it is not apparent that this phenomenon will change soon, is the fact that each party is motivated essentially by fear and/or mistrust. Their principal concern is with their security and survival. In the words of international relations theorists, namely realists and neo-realists, "preoccupation with autonomy, power, and security – elements that can only be secured by acquiring superior capabilities in the form of economic, military, and political resources – predisposes states toward conflict and competition."¹⁸² In other words, non-cooperation. Moreover, since states fear for their security, they are preoccupied not only with power, but also with the fear that if they were to cooperate their partners could eventually turn out to be better off than them by having achieved relatively greater gains.¹⁸³ Because of this possibility, a state would be wise not to cooperate. In the case of the Arab-Israeli water dispute, because water is an essential input for economic growth/development, and thus national security, each side has remained fearful that an agreement might strengthen the other. From the Arab point of view, water will be used to support additional Jewish immigration and the sustainment if not outright growth of Jewish settlements. As alluded to before, Israel believes concessions would create facts on the ground that would reinforce the Palestinians' demand for territorial changes, that is, sovereignty.

In summary, because the parties retain the perception that they have little to gain materially and much to lose politically, the prospect for cooperation is dim.

¹⁸² Joseph M. Grieco, "Anarchy and the Limits of Cooperation: A Realist Critique of the Newest Liberal Institutionalism," *International Organization* Vol. 42, No. 3 (Summer 1988), pp. 486-507. And also, Helen Milner, "International Theories of Cooperation Among Nations: Strengths and Weaknesses," *World Politics* Vol. 44, No. 3, April 1992.

¹⁸³ Duncan Snidal, "Relative Gains and the Pattern of International Cooperation," *American Political Science Review* Vol. 85, No. 3 (September 1991). And also, Robert Powell, "Absolute and Relative Gains in International Relations Theory," *American Political Science Review*, Vol. 85, No. 4 (December 1991).

B. THE MIDDLE EAST

The troubles besetting the Middle East are many and varied. Among them are wide disparities of wealth between an affluent few and an impoverished multitude, thwarted national aspirations – such as Pan-Arabism, disputed borders, religious fanaticism/extremism, indiscriminate terrorism, ethnic civil wars, and megalomaniac dictators. These afflictions, including the Arab-Israeli conflict, combine to make the Middle East one of the world's most unstable regions, where an intensifying arms race poses the real danger that the next war will be fought with weapons of mass destruction.

With the end of the Cold War, the overriding (or overarching) issue is no longer the global struggle between socialism and capitalism. The internal conflict besetting the Middle East region threatens to revert to its most atavistic form: xenophobic particularism, amplified by religious extremism, both exacerbated or fed by pervasive poverty and a general sense of deprivation.¹⁸⁴ This phenomenon cannot be contained, accommodated, or repressed. As the United States's *National Security Strategy* calls for, the forces that may provoke instability and crisis must be proactively “engaged,” and thus, prevented from ever surfacing – in general terms, the international security environment must be “shaped” so that long-term stability is achieved.¹⁸⁵

In general, the Middle East requires a constructive and comprehensive program of economic development and environmental rehabilitation. As far the Arab-Israeli peace process is concerned, for it to be credible, and therefore a potential stabilizing force in the region, it must begin to produce tangible results, not only in the political arena but also – and more importantly – in the areas of living standards, employment, and infrastructure

¹⁸⁴ Hillel, *Rivers of Eden*, p. 281.

¹⁸⁵ Clinton, *A National Security Strategy*, p.1.

development. An essential element of any development program is the provision of fresh water to deprived nations. Each of the nations involved, such as Turkey, Iraq, Syria, Egypt, and Ethiopia – but particularly Israel and the PLO – consider independent control of the region's water resources tantamount to their respective national destinies. However, the hydrogeologic realities of the region have deprived most of the states exclusive water resources sufficient to their needs. In short, there can be no ultimate independence, only mutual dependence.¹⁸⁶

As the rivalry over common waters between neighboring states and territories intensifies due to accelerating population growth, industrialization, and urbanization, the Middle East is poised on a precarious watershed divide, between war and peace. The overall implication is that the United States, as the world's only superpower, possessing, by its own admission, the "responsibility to lead and prevent instability," will be forced to involve itself in the resolution of future riparian disputes. Given the United States's role, and the potential for armed conflict over water, the United States must implement a more assertive foreign policy focused on: (1) establishing a unitary basin-wide management scheme, developed by all parties involved; (2) enforcing international law; (3) continued finance of water purification and desalination research and development; (4) consideration of bringing political pressure to bear on those parties, such as Israel – however politically unpalatable, that refuse to cooperate; and (5) deliberate and crisis action planning designed to handle, if need be, the defense of allied or neutral country dams, canals, water import vehicles/routes, and water development projects. Any alternative strategy simply facilitates increasing scarcity, thereby inviting competition – and thus conflict, and may result in war.

¹⁸⁶ Hillel, *Rivers of Eden*, p. 283.

LIST OF REFERENCES

- "Arafat and Netanyahu Address the State of Middle East Peace Talks," CNN's *World Report*, 7 May 1998.
- Assistant Head Engineer of Reynolds Aluminum Company, interview by author, 1 May 1998.
- Axelrod, R., *The Evolution of Cooperation* (New York: Basic Books, 1984).
- Berkoff, J., *A Strategy for Managing Water in the Middle East and North Africa* (Washington, D.C.: The World Bank, 1994).
- Bickerton, I. J. and Klausner, C. L., *A Concise History of the Arab-Israeli Conflict*, 3rd ed. (New Jersey: Prentice Hall, 1998).
- Biswas, A., Kolars, J., Murakami, M., Waterbury, J., and Wolf, A., *Core and Periphery: A Comprehensive Approach to Middle Eastern Water* (Oxford: Oxford University Press, 1997).
- Brecher, M., *Decisions in Israel's Foreign Policy* (New Haven: Yale University Press, 1975).
- British Broadcasting Corporation, *BBC Worldwide Monitoring*, "Palestinian Official Notes Deterioration in Water Situation," 27 July 1997.
- Brown, L., *State of the World 1994* (New York: Worldwatch Institute, 1997).
- Bulloch and Darwish, *Water Wars: Coming Conflicts in the Middle East* (London: London University Press, 1993).
- Clagett, B. and Johnson, T., "May Israel as a Belligerent Occupant Lawfully Exploit Previously Unexploited Resources on the Gulf of Suez?," *American Journal of International Law* Vol. 79 (July 1978).
- Clinton, W. J., *A National Security Strategy for a New Century* (Washington, D.C.: U.S. Government Printing Office, 1997).
- Cowell, A., "Next Flashpoint in the Middle East: Water," *New York Times*, 16 April 1989.
- Crabb, Cecil V. Jr., *The Doctrines of American Foreign Policy: Their Meaning, Role, and Future* (Baton Rouge: Louisiana State University Press, 1982).

- C-SPAN coverage of American Press Club, *Arab-Israeli Peace Negotiations* (Washington, D.C.: American Press Club, 5 May 1998).
- Daly, P. H., Plans, Policy, and Resources Office of the Joint Chiefs of Staff, interview by author, 24 May 1998.
- Davis, U., Maks, A., Richardson, J., "Israel's Water Policies," *Journal of Palestine Studies* Vol. 9, No. 2 (Winter 1980).
- Dillman, Jeffery D., "Water Rights in the Occupied Territories," *Journal of Palestine Studies* Vol. 19, No. 1 (Autumn 1989).
- Dinar, A. and Subramanian, A., *Water Pricing Experiences: An International Perspective*, World Bank Technical Paper no. 386 (Washington, D.C.: The World Bank, 1997).
- Dockerson, A., "Greenpolitik: Threats to Environment Provoke a New Security Agenda," *Wall Street Journal*, 20 November 1997.
- Falkenmark, M., "Fresh Water as a Factor in Strategic Policy and Action," in Arthur H. Westing, ed., *Global Resources and International Conflict: Environmental Factors in Strategic Policy and Action* (Oxford: Oxford University Press, 1986).
- Gabbay, S., *The Environment in Israel* (Israel: Ministry of the Environment, 1994).
- Gleick, P. H., "Water and Conflict: Fresh Water Resources and International Security," *International Security* Vol. 18, No. 1 (Summer 1993).
- Goldie, L., "Title and Use (and Usufruct) – An Ancient Distinction Too Often Forgotten," *American Journal of International Law* Vol. 79 (July 1985).
- Grieco, J. M., "Anarchy and the Limits of Cooperation: a Realist Critique of the Newest Liberal Institutionalism," *International Organization* Vol. 42, No. 3 (Summer 1988).
- Haas, E., *Beyond the Nation-State: Functionalism and International Organization* (Stanford: Stanford University Press, 1964).
- Hassoun, R., "Water Between Arabs and Israelis: Researching Twice-Promised Resources" in John Donahue and Barbara Johnson, eds., *Water, Culture, & Power: Local Struggles in a Global Context* (Washington, D.C.: Island Press, 1998).
- Hillel, D., *Rivers of Eden: The Struggle for Water and the Quest for Peace in the Middle East* (Oxford: Oxford University Press, 1994).
- Horan, D., "Palestinians and Israelis Lock Horns Over Water," *Inter Press Service*, 20 March 1998.

- House Committee on Foreign Affairs: Subcommittee on Europe and the Middle East, *The Middle East in the 1990s: Middle East Water Issues* (Washington, D.C., 26 June 1990).
- Inbar, E., "Regional Security Regimes: Israel and Its Neighbors," *Regional Security Issues* Vol. 32, No. 3, (1995).
- Inbar, E., Isaac, J. and Shelby, J., "The Palestinian Water Crisis: Status, Projections and Potential for Resolution," *Natural Resources Forum* Vol. 20, No. 7, 1996.
- Jervis, R., *Perception and Misperception in International Relations* (Princeton: Princeton University Press, 1976).
- Jhel, D., "Israel to Build Dam on Disputed Land Claimed by Syria," *New York Times*, 26 August 1997.
- Keohane, R., "Neoliberal Institutionalism: A Perspective on World Politics" in *International Institutions and State Power* (Boulder: Westview Press, 1989).
- Kimmerling, B. and Migdal, J. S., *Palestinians: The Making of a People* (Massachusetts: Harvard University Press, 1997).
- Khuri, F. J., *The Arab-Israeli Dilemma* (New York: Syracuse University Press, 1968).
- Knight, D., "Water Looms as Major Source of Conflict Next Century," *Inter Press Service*, 11 March 1998.
- Lipschutz, R. D., *When Nations Clash: Raw Materials, Ideology, and Foreign Policy* (New York: Ballinger Publishing Co., 1989).
- Lonergan, Stephan and Brooks, D. B., *Watershed: The Role of Fresh Water in the Israeli-Palestinian Conflict* (Ottawa, Canada: International Development Research Center, 1994).
- Kolars, J., "The Course of Water in the Arab Middle East," *American-Arab Affairs* No. 33 (Summer 1990).
- Lowi, M., *Water and Power* (Massachusetts: Cambridge University Press, 1993).
- "Resource Scarcity and Protracted Conflict," in Daniel Deudney and Richard Matthew, eds., *Contested Ground: Security and Conflict in the New Environmental Politics* (New York: State University of New York Press, 1995).
- Mansfield, P., *A History of the Middle East* (London: Penguin Books, 1992).
- McCaffrey, S., "Water, Politics, and International Law," in Gleick, ed., *Water in Crisis* (New York: Oxford University Press, 1993).

- McGeath, M. D. *Canada's Water Resources: The Whistler/Black Combe Plan* (Ottawa, Canada: International Development Research Center, 1994).
- Milner, H., "International Theories of Cooperation Among Nations: Strengths and Weaknesses," *World Politics* Vol. 44, No. 3 (April 1992).
- Murakami, M., *Managing Water for Peace in the Middle East* (United Nations: United Nations University Press, 1995).
- Naff, T., "The Jordan Basin: Political, Economic, and Institutional Issues" in *Country Experiences with Water Resources Management: Economic, Institutional, Technological and Environmental Issues*, World Bank Technical Paper no. 175 (Washington, D.C.: World Bank, 1992).
- Naff, T. and Mattson, R. C., eds., *Water in the Middle East: Conflict or Cooperation?* (Boulder: Westview Press, 1984).
- Peters, J., *Building Bridges: The Arab-Israeli Multilateral Talks* (London: The Royal Institute of International Affairs, 1994).
- Postel, S., *Last Oasis: Facing Water Scarcity* (New York: W.W. Norton & Company, 1997).
- Powell, R., "Absolute and Relative Gains in International Relations Theory," *American Political Science Review* Vol. 85, No. 4 (December 1991).
- Prusher, I. R., "Water Lies at Heart of Mideast Land Fight," *Christian Science Monitor*, 17 April 1998.
- Quiring, P., "Israeli Settlements and Palestinian Rights, Part 2," *Middle East International* (October 1987).
- Ramati, S., "Water War and the Mideast," *Chicago Tribune*, 2 March 1985.
- Richards, A. and Waterbury, J., *A Political Economy of the Middle East*, 2nd ed. (Boulder: Westview Press, 1996).
- Rouyer, A. R., "The Water Issue in the Palestinian-Israeli Peace Process," *Survival* Vol. 39, No. 2 (Summer 1997).
- "Zionism and Water: Influences on Israel's Future Water Policy During the Pre-State Period," *Arab Studies Quarterly* Vol. 18, No. 4 (Fall 1996).
- Salameh, E., "Jordan's Water Resources: Development and Future Prospects," *American-Arab Affairs* No. 33 (Summer 1990).

Schmidt, D. A., "Prospects for a Solution of the Jordan River Valley Dispute," *Middle Eastern Affairs* Vol. 6, No. 1 (January 1955).

Serageldin, I., *Water Supply, Sanitation, and Environmental Sustainability: the Financing Challenge* (Washington, D.C.: World Bank, 1994).

Shalikashvili, J. M., *National Military Strategy: Shape, Respond, Prepare Now – A Military Strategy for a Era* (Washington, D.C. U.S. Government Printing Office, 1997).

User's Guide for Joint Operation Planning, 11 September 1994.

Shuval, H., *A Proposal for the Development of a Regional Water Master Plan* (Jerusalem: Israel-Palestine Center for Research and Information, 1993).

Snidal, D., "Relative Gains and the Pattern of International Cooperation," *American Political Science Review* Vol. 85, No. 3 (September 1991).

Starr, Joyce R., "Water Wars," *Foreign Policy* No. 82 (Spring 1991).

Taubenblatt, S., "The Jordan River Basin Water Dilemma: a Challenge for the 1990s," in Joyce Starr and Daniel Stoll, eds., *The Politics of Scarcity: Water in the Middle East* (Boulder: Westview Press, 1988).

Temko, N., "Water – Toughest Issue on West Bank," *Christian Science Monitor*, 18 September 1979.

Young, G. J., *Global Water Resource Issues* (Cambridge: Cambridge University Press, 1994).

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